ArrayPitope: Automated Analysis of Amino Acid Substitutions for Peptide Microarray-Based Antibody Epitope Mapping

Identification of epitopes targeted by antibodies (B cell epitopes) is of critical importance for the development of many diagnostic and therapeutic tools. For clinical usage, such epitopes must be extensively characterized in order to validate specificity and to document potential cross-reactivity. B cell epitopes are typically classified as either linear epitopes, i.e. short consecutive segments from the protein sequence or conformational epitopes adapted through native protein folding. Recent advances in high-density peptide microarrays enable high-throughput, high-resolution identification and characterization of linear B cell epitopes. Using exhaustive amino acid substitution analysis of peptides originating from target antigens, these microarrays can be used to address the specificity of polyclonal antibodies raised against such antigens containing hundreds of epitopes. However, the interpretation of the data provided in such large-scale screenings is far from trivial and in most cases it requires advanced computational and statistical skills. Here, we present an online application for automated identification of linear B cell epitopes, allowing the non-expert user to analyse peptide microarray data. The application takes as input quantitative peptide data of fully or partially substituted overlapping peptides from a given antigen sequence and identifies epitope residues (residues that are significantly affected by substitutions) and visualize the selectivity towards each residue by sequence logo plots. Demonstrating utility, the application was used to identify and address the antibody specificity of 18 linear epitope regions in Human Serum Albumin (HSA), using peptide microarray data consisting of fully substituted peptides spanning the entire sequence of HSA and incubated with polyclonal rabbit anti-HSA (and mouse anti-rabbit-Cy3). The application is made available at: www.cbs.dtu.dk/services/ArrayPitope.
Sensitivity to Angular and Radial Source Movements as a Function of Acoustic Complexity in Normal and Impaired Hearing

In contrast to static sounds, spatially dynamic sounds have received little attention in psychoacoustic research so far. This holds true especially for acoustically complex (reverberant, multisource) conditions and impaired hearing. The current study therefore investigated the influence of reverberation and the number of concurrent sound sources on source movement detection in young normal-hearing (YNH) and elderly hearing-impaired (EHI) listeners. A listening environment based on natural environmental sounds was simulated using virtual acoustics and rendered over headphones. Both near-far ('radial') and left-right ('angular') movements of a frontal target source were considered. The acoustic complexity was varied by adding static lateral distractor sound sources as well as reverberation. Acoustic analyses confirmed the expected changes in stimulus features that are thought to underlie radial and angular source movements under anechoic conditions and suggested a special role of monaural spectral changes under reverberant conditions. Analyses of the detection thresholds showed that, with the exception of the single-source scenarios, the EHI group was less sensitive to source movements than the YNH group, despite adequate stimulus audibility. Adding static sound sources clearly impaired the detectability of angular source movements for the EHI (but not the YNH) group. Reverberation, on the other hand, clearly impaired radial source movement detection for the EHI (but not the YNH) listeners. These results illustrate the feasibility of studying factors related to auditory movement perception with the help of the developed test setup.

General information
State: Published
Organisations: Department of Acoustic Technology, Department of Electrical Engineering
Authors: Lundbeck, M. (Ekstern), Grimm, G. (Ekstern), Hohmann, V. (Ekstern), Laugesen, S. (Intern), Neher, T. (Ekstern)
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Main Research Area: Technical/natural sciences
Do wavelet filters provide more accurate estimates of reverberation times at low frequencies

It has been amply demonstrated in the literature that it is not possible to measure acoustic decays without significant errors for low BT values (narrow filters and or low reverberation times). Recently, it has been shown how the main source of distortion in the time envelope of the acoustic decay is the frequency dependent group delay of the common implementations of the 1/3 and 1/1 octave filters. Some authors report good results using wavelet filter banks as an alternative to the usual filters. In this paper, a critical review of the performance of wavelet filter banks is undertaken. A filter bank using the continuous wavelet transform (CTW) has been implemented using a Morlet mother function. Although in general, the wavelet filter bank performs better than the usual filters, the influence of decaying modes outside the filter bandwidth on the measurements has been detected, leading to a biased estimation of the reverberation time in the frequency band of interest.
Temporal Fine-Structure Coding and Lateralized Speech Perception in Normal-Hearing and Hearing-Impaired Listeners

This study investigated the relationship between speech perception performance in spatially complex, lateralized listening scenarios and temporal fine-structure (TFS) coding at low frequencies. Young normal-hearing (NH) and two groups of elderly hearing-impaired (HI) listeners with mild or moderate hearing loss above 1.5 kHz participated in the study. Speech reception thresholds (SRTs) were estimated in the presence of either speech-shaped noise, two-, four-, or eight-talker babble played reversed, or a nonreversed two-talker masker. Target audibility was ensured by applying individualized linear gains to the stimuli, which were presented over headphones. The target and masker streams were lateralized to the same or to opposite sides of the head by introducing 0.7-ms interaural time differences between the ears. TFS coding was assessed by measuring frequency discrimination thresholds and interaural phase difference differences at 250 Hz. NH listeners had clearly better SRTs than the HI listeners. However, when maskers were spatially separated from the target, the amount of SRT benefit due to binaural unmasking differed only slightly between the groups. Neither the frequency discrimination threshold nor the interaural phase difference threshold tasks showed a correlation with the SRTs or with the amount of masking release due to binaural unmasking, respectively. The results suggest that, although HI listeners with normal hearing thresholds below 1.5 kHz experienced difficulties with speech understanding in spatially complex environments, these limitations were unrelated to TFS coding abilities and were only weakly associated with a reduction in binaural-unmasking benefit for spatially separated competing sources.

General information
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Organisations: Department of Electrical Engineering, Hearing Systems, Department of Acoustic Technology, Eriksholm Research Centre
Authors: Locsei, G. (Intern), Pedersen, J. H. (Ekstern), Laugesen, S. (Intern), Santurette, S. (Intern), Dau, T. (Intern), MacDonald, E. (Intern)
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Scopus rating (2013): SJR 0.953 SNIP 1.099
Scopus rating (2012): SJR 0.981 SNIP 0.909
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Scopus rating (2009): SJR 1.263 SNIP 1.208
Scopus rating (2008): SJR 1.87 SNIP 1.678
Scopus rating (2007): SJR 2.255 SNIP 2.124
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Scopus rating (2005): SJR 0.892 SNIP 0.572
Scopus rating (2004): SJR 0.289 SNIP 0.259
Scopus rating (2003): SJR 0.524 SNIP 1.142
Scopus rating (2002): SJR 0.377 SNIP 1.134
Scopus rating (2001): SJR 0.308 SNIP 1.09
Scopus rating (2000): SJR 0.133 SNIP 0
Scopus rating (1999): SJR 0.297 SNIP 0.706
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Locsei2016.pdf
Compensation of the flux modulation distortion using an additional coil in a loudspeaker unit

Flux modulation is one of the main causes of distortion in electrodynamic loudspeaker units. A new compensation technique that eliminates this type of non-linearity using an additional compensation coil in the speaker unit is presented. An equivalent circuit model of the device including the compensation coil is derived. The compensation technique consists on feeding the compensation coil and voice coil with filtered versions of the wanted audio signal. Simulations show that a significant reduction in flux modulation distortion can be achieved with this technique. A simple magnetic circuit has been constructed to test the method on a real device, and the measurements show the method works, also when eddy currents are present.

Conservation of power of the supersonic acoustic intensity

The supersonic intensity is a quantity that represents the net acoustic output that a source couples into the medium; it can be regarded as a spatially low-pass filtered version of the active intensity. This spatial filtering can lead to significant error due to spatial truncation. In this paper, based on a space-domain formulation of the problem, the finite aperture error is analyzed and examined experimentally. The results indicate that the finite aperture error can be mitigated with the appropriate processing and that the supersonic intensity provides a valid quantitative representation of the effective radiation of acoustic sources.
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BFI (2011): BFI-level 2
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Scopus rating (2010): SJR 0.754 SNIP 1.528
Web of Science (2010): Indexed yes
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Scopus rating (2009): SJR 0.783 SNIP 1.717
Web of Science (2009): Indexed yes
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Scopus rating (2008): SJR 0.848 SNIP 1.633
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Web of Science (2002): Indexed yes
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CTL epitopes of FMDV determined by NetMHCpan-driven predictions of SLA/peptide binding, confirmed by tetramer complex formation and staining

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Publication: Research › Poster – Annual report year: 2010

Peptide Binding to HLA Class I Molecules: Homogenous, High-Throughput Screening, and Affinity Assays
The Human MHC Project aims at large-scale description of peptide-HLA binding to a wide range of HLA molecules covering all populations of the world and the accompanying generation of bioinformatics tools capable of predicting binding of any given peptide to any given HLA molecule. Here, the authors present a homogenous, proximity-based assay for detection of peptide binding to HLA class I molecules. It uses a conformation-dependent anti-HLA class I antibody, W6/32, as one tag and a biotinylated recombinant HLA class I molecule as the other tag, and a proximity-based signal is generated through the luminescent oxygen channeling immunoassay technology (abbreviated LOCI and commercialized as AlphaScreen (TM)). Compared with an enzyme-linked immunosorbent assay-based peptide-HLA class I binding assay, the LOCI assay yields virtually identical affinity measurements, although having a broader dynamic range, better signal-to-background ratios, and a higher capacity. They also describe an efficient approach to screen peptides for binding to HLA molecules. For the occasional user, this will serve as a robust, simple peptide-HLA binding assay. For the more dedicated user, it can easily be performed in a high-throughput screening mode using standard liquid handling robotics and 384-well plates. We have successfully applied this assay to more than 60 different HLA molecules, leading to more than 2 million measurements. (Journal of Biomolecular Screening 2009: 173-180)

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Organisations: Department of Systems Biology, Center for Biological Sequence Analysis, Department of Acoustic Technology
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Cross-spectral synergy and consonant identification (A)
The auditory processing of consonants was investigated using an information-theoretic approach. Listeners identified eleven different Danish consonants spoken in a Consonant + Vowel + [l] environment. Each syllable was processed so that only a portion of the original audio spectrum was present. Three-quarter-octave bands of speech, with center frequencies of 750, 1500 and 3000 Hz, were presented individually and in combination with each other. Confusion matrices were computed, and from these the amount of information transmitted for each of three phonetic-features - voicing, manner and place of articulation - was computed for each condition. From such analyses one can determine whether information associated with any given phonetic feature combines linearly across the acoustic spectrum or not. Our results indicate that information associated with voicing and manner-of-articulation combines in quasilinear fashion across the frequency spectrum. In contrast, place-of-articulation cues are integrated synergistically - information associated with two or three channels combined is far greater than predicted from the amount of information associated with individual spectral bands. Because consonants are essential for understanding speech, and place-of-articulation information is crucial for decoding consonants, spoken language perception is likely to reflect highly non-linear processes.
Improvements on the directional characteristics of a calibration sound source using the Boundary Element Method

The project Euromet-792 aims to investigate and improve methods for secondary free-field calibration of microphones. In this framework, the comparison method is being studied at DFM in relation to the more usual substitution method of microphone calibration. The design of the sound source is of particular importance to achieve a sound field that reaches both microphones with the same level and that is sufficiently uniform at the microphone positions, in order to reduce the effect of misalignment. An existing sound source has been modeled using the Boundary Element Method, and the simulations have been used to modify the source and make it suitable for this kind of calibration. It has been found that a central plug, already present in the device, can be re-shaped in such a way that makes the sound field on the microphone positions more uniform, even at rather high frequencies. Measurements have been carried out in order to verify the goodness of this solution.
Relationship between room shape and acoustics of rectangular concert halls

Extensive acoustics computer simulations have been made using Odeon computer simulation software. In 24 rectangular rooms representing "shoe-box" type concert halls with volumes of 8 000 m³, 12 000 m³ and 16 000 m³ from 300 to 850 measurements positions have been analysed. Only room averaged objective measures are considered here, in particular Clarity (C₈₀), Strength (G) and Early Lateral Energy Fraction (LF₈₀). Results from simulations have been compared with regression models created based on real hall measurements. In general, simulated results of C₈₀ and G are found to be in good agreement with regression models. Divergences are found in LF₈₀ behaviour; these have been associated with influence of proportions of rectangular halls. Updated formula for predicting of LF₈₀ in rectangular halls has been proposed, which takes into the account both width and length of hall.

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Organisations: Department of Acoustic Technology
Authors: Klosak, A. K. (Ekstern), Gade, A. C. (Intern)
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Sound reflection and absorption: Translation of Note 4209: "Lydreflektion og absorption" 1981

General information
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Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Publication date: 2008


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State: Published
Organisations: Department of Acoustic Technology, Department of Electrical Engineering, Acoustic Technology, Department of Applied Electronics
Authors: Wendelboe, G. (Intern), Jacobsen, F. (Intern), Sørensen, H. B. D. (Intern)
Number of pages: 169
Publication date: Mar 2007

CTL epitopes for influenza A including the H5N1 bird flu; genome-, pathogen-, and HLA-wide screening
The purpose of the present study is to perform a global screening for new immunogenic HLA class I (HLA-I) restricted cytotoxic T cell (CTL) epitopes of potential utility as candidates of influenza A-virus diagnostics and vaccines. We used predictions of antigen processing and presentation, the latter encompassing 12 different HLA class I supertypes with >99% population coverage, and searched for conserved epitopes from available influenza A viral protein sequences. Peptides corresponding to 167 predicted peptide-HLA-1 interactions were synthesized, tested for peptide-HLA-1 interactions in a biochemical assay and for influenza-specific, HLA-1-restricted CTL responses in an IFN-gamma ELISPOT assay. Eighty-nine peptides could be confirmed as HLA-1 binders, and 13 could be confirmed as CTL targets. The 13 epitopes, are highly conserved among human influenza A pathogens, and all of these epitopes are present in the emerging bird flu isolates. Our study demonstrates that present technology enables a fast global screening for T cell immune epitopes of potential diagnostics and vaccine interest. This technology includes immuno-bioinformatics predictors with the capacity to perform fast genome-, pathogen-, and HLA-wide searches for immune targets. To exploit this new potential, a coordinated international effort to analyze the precious source of information represented by rare patients, such as the current victims of bird flu, would be essential.

General information
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Main Research Area: Technical/natural sciences

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In the Mediterranean area a large number of open, ancient Greek and Roman theatres are still today facing a busy schedule of performances including both classical and contemporary works of dance, drama, concerts, and opera. During the EU funded "Erato" project and a subsequent master thesis project, extensive measurement data have been collected from three well-preserved theatres, which represent three different stages of enclosing the audience in an open-air environment: (1) the Epidaurus Theatre in Greece without skenae wall or columnade behind the cavea; (2) the Jerash South theatre in Jordan with skenae wall but no columnade; and (3) the Aspendos Theatre in Turkey having both a full skenae building and a columnade around the cavea. In the paper the acoustic characteristics of these theatres will be compared and discussed in the light of acoustic performance requirements for modern use.
A Study on the Characteristics of Phased Beam Tracing Method for the Acoustic Simulation of an Enclosure at Mid Frequencies

High frequency acoustic analysis of an enclosure has been dealt with by geometrical acoustic techniques and low frequency response can be estimated by modal methods; however, mid frequency range has been a grey zone. The phased beam tracing method (PBTM) is one of the mid-frequency techniques, which can calculate a pressure impulse response rather than energy reflectogram, although main assumptions in geometric acoustics still hold. The phased method utilizes the reflection coefficient representing the acoustic property of a surface and the complex wave number to describe the propagation characteristics. In this study, a room was chosen as a demonstration example and the proposed method was applied to this room; the result was compared with measurements. Diffraction and scattering effects were assumed to be negligible and only the geometrical law of reflection was considered. It was found that the phased method is advantageous compared to the conventional ray/beam tracing method: accurate prediction of early part of impulse response, better agreement with measured data, lower and extendable frequency range. This means that the technique can be employed in calculating the sound quality metrics and the auralization of rooms. If the demerit of disregarding diffraction and scattering effects is improved, this method can be a mid-frequency bridge to connect the modal method and geometrical acoustic method for the acoustic simulation of an enclosure in a unified approach.
A transparency model and its applications for simulation of reflector arrays and sound transmission (A)
The paper describes a new method for simulating the frequency-dependent reflection and transmission of reflector arrays, and the frequency-dependent airborne sound insulation between rooms by means of a room acoustic computer model. The method makes use of a transparency method in the ray-tracing process. In the first step of the calculation the rays hitting the relevant surfaces may either be reflected or transmitted, using a probability of 50%. In the next step the impulse responses in the receiver positions are calculated using a frequency-dependent correction to account for the reflected or transmitted energy. The method applied for the reflector array is based on a theoretical model that takes into account the dimensions of the reflecting surface, path lengths, and angle of incidence. The transmission calculation is based on the users' data for the frequency-dependent transmission loss of the partition, and this is useful for the auralization of sound transmission through different building constructions. The acoustic properties like volume, reverberation time, and the area of the transmitting surfaces are included in the simulation.

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Organisations: Department of Acoustic Technology
Authors: Christensen, C. L. (Intern), Rindel, J. H. (Intern)
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BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
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Auralization of an orchestra using multichannel and multisource technique (A)

Previous work has shown the importance of including source directivity in computer modeling for auralizations. A newer method to capture source directivity in auralizations is the multichannel technique, which uses multichannel anechoic recordings. In this study, five-channel anechoic recordings were obtained for every orchestral part of two symphonies at the Technical University of Denmark. Five-channel auralizations were then created for each instrument, located at its typical position on-stage in a concert hall, byconvolving five impulse responses from sources that each represent approximately one-fifth of a sphere with the corresponding anechoic recording channel and mixing these together. The multichannel auralizations from each instrument were subsequently combined to produce a full multichannel auralization of the entire orchestra. The results from listening tests will be presented, illustrating the perceived changes in realism, source width and depth, and source separation between the output of this full orchestral mix of multichannel auralizations and other auralization methods, including the following: (i) a mix of single-channel auralizations from each instrument, and auralizations made with a single channel orchestral anechoic recording using (ii) a surface source and (iii) a single omni-directional source. [Work supported by the National Science Foundation.]
Predictors of auditory performance in hearing-aid users: The role of cognitive function and auditory lifestyle (A)

Within clinical audiology, it is often observed that patients who are expected to perform the same differ in auditory performance. Hearing-aid users may be dissatisfied with their instruments while they score satisfactorily in objective tests, or they may be satisfied with their instruments while no objective benefit can be measured. It has been suggested that lack of agreement between various hearing-aid outcome components can be explained by individual differences in cognitive function and auditory lifestyle. We measured speech identification, self-report outcome, spectral and temporal resolution of hearing, cognitive skills, and auditory lifestyle in 25 new hearing-aid users. The purpose was to assess the predictive power of the nonauditory measures while looking at the relationships between measures from various auditory-performance domains. The results showed that only moderate correlation exists between objective and subjective hearing-aid outcome. Different self-report outcome measures showed a different amount of correlation with objective auditory performance. Cognitive skills were found to play a role in explaining speech performance and spectral and temporal abilities, and auditory lifestyle was correlated with self-report outcome. However, overall the predictive leverage of the various measures was moderate, with single predictors explaining only up to 19 percent of the variance in the auditory-performance measures.

a) Now at CNBH, Department of Physiology, Development and Neuroscience, University of Cambridge, UK.
A novel system for continuous protein refolding and on-line capture by expanded bed adsorption

A novel two-step protein refolding strategy has been developed, where continuous renaturation-by-dilution is followed by direct capture on an expanded bed adsorption (EBA) column. The performance of the overall process was tested on a N-terminally tagged version of human beta(2)-microglobulin (HAT-h beta(2)m) both at analytical, small, and preparative scale. In a single scalable operation, extracted and denatured inclusion body proteins from Escherichia coli were continuously diluted into refolding buffer, using a short pipe reactor, allowing for a defined retention and refolding time, and then fed directly to an EBA column, where the protein was captured, washed, and finally eluted as soluble folded protein. Not only was the eluted protein in a correctly folded state, the purity of the HAT-h beta(2)m was increased from 34% to 94%, and the product was concentrated sevenfold. The yield of the overall process was 45%, and the product loss was primarily a consequence of the refolding reaction rather than the EBA step. Full biological activity of HAT-h beta(2)m was demonstrated after removal of the HAT-tag. In contrast to batch refolding, a continuous refolding strategy allows the conditions to be controlled and maintained throughout the process, irrespective of the batch size; i.e., it is readily scalable. Furthermore, the procedure is fast and tolerant toward aggregate formation, a common complication of in vitro protein refolding. In conclusion, this system represents a novel approach to small and preparative scale protein refolding, which should be applicable to many other proteins.

General information
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Organisations: Department of Systems Biology, Department of Acoustic Technology
Authors: Ferré, H. (Intern), Ruffet, E. (Ekstern), Nielsen, L. (Ekstern), Nissens, M. (Ekstern), Hobley, T. J. (Intern), Thomas, O. (Ekstern), Buus, S. (Intern)
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Scopus rating (2016): SJR 1.685 SNIP 0.791 CiteScore 2.68
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Scopus rating (2015): SJR 1.998 SNIP 0.903 CiteScore 2.99
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.805 SNIP 0.855 CiteScore 2.77
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.982 SNIP 0.819 CiteScore 2.96
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Scopus rating (2012): SJR 1.932 SNIP 0.818 CiteScore 2.76
ISI indexed (2012): ISI indexed yes
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Measurement of absorption with a p-u sound intensity probe in an impedance tube

An alternative method of measuring the normal-incidence sound absorption of a sample of material in an impedance tube is examined. The method is based on measurement of the sound pressure and the normal component of the particle velocity using a "p-u" sound intensity probe. This technique is compared with the traditional, well-established "transfer function method" based on two pressure microphones. The results suggest that the new method can be as accurate as the established method, but whereas the influence of transducer mismatch on the transfer function method can be eliminated using a simple "sensor-switching technique," the method based on a p-u intensity probe relies on accurate calibration of the probe.

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Authors: Liu, Y. (Ekstern), Jacobsen, F. (Intern)
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Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.754 SNIP 1.528
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.783 SNIP 1.717
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.848 SNIP 1.633
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.865 SNIP 1.647
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.752 SNIP 1.559
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.954 SNIP 1.749
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.77 SNIP 1.787
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.882 SNIP 1.712
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.87 SNIP 1.501
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.719 SNIP 1.467
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.621 SNIP 1.411
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.591 SNIP 1.319

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Predicting and auralizing acoustics in classrooms

Although classrooms have fairly simple geometries, this type of room is known to cause problems when trying to predict their acoustics using room acoustics computer modeling. Some typical features from a room acoustics point of view are: Parallel walls, low ceilings (the rooms are flat), uneven distribution of absorption, and most of the floor being covered with furniture which at long distances act as scattering elements, and at short distance provide strong specular components. The importance of diffraction and scattering is illustrated in numbers and by means of auralization, using ODEON 8 Beta.
Søren Buus. Thirty years of psychoacoustic inspiration
Søren Buus did his MSc at the Acoustics Laboratory, Technical University of Denmark (DTU), in 1975 on the topic headphone calibration. He showed the importance of reliable reference values for psychoacoustic research and Søren was a great inspiration for my work (Scand. Audiol. 20, 205–207 (1991); 27, 105–112 (1998)). Already from the seventies, temporal integration of loudness has been a major topic in the collaboration with Søren (Buus et al., J. Acoust. Soc. Am. 105, 3464–3480 (1999)) and the measurements of temporal integration over a wide range of presentation levels led to the important finding about the shape of the loudness function (Buus et al., J. Acoust. Soc. Am. 100, 669–680 (1997)). Søren talked about the importance of the psychophysical procedure and the influence from the procedure on the results (Buus, Proceedings 19th Danavox Symposium (2001), pp. 183–226). The goal was to obtain reliable, unbiased, and precise results. An overview of some of the above investigations will be presented together with recent results from a MSc project on headphone calibration of short duration sounds for ABR measurements.
Temporal and spectral resolution of hearing in patients with precipitous hearing loss: Gap release of masking (GRM) and the role of cognitive function

The purpose of this experiment was to measure temporal acuity and spectral resolution of hearing in new hearing-aid users over a period of time post-fitting, and to demonstrate the extent to which performance might change over time. For one-octave wide maskers with and without spectral and temporal gaps, masking was measured repeatedly over 3 months post-fitting. GRM was characterized as the release from masking under the gap conditions. The cognitive skills of the participants were assessed with two tests for measuring working memory capacity and lexical vigilance. The results showed that while the masking by one-octave wide noise maskers without any gaps was constant over time, GRM increased over time for maskers involving a temporal gap. Moreover, at low frequencies where the subjects had normal hearing-threshold levels, they performed as hearing-impaired for the spectral-gap condition. For the temporal-gap condition, they performed as normally hearing at both low and high frequencies. These results suggest that patients with precipitous hearing loss do not maintain normal spectral resolution through the low-frequency region, in which the hearing threshold levels are otherwise normal. Surprisingly, the results also showed moderate though highly significant correlation between lexical vigilance and GRM. [Work supported by the William Demant Foundation.]

a) Currently at CNBH, Dept. Physiol., University of Cambridge, CB2 3EG Cambridge, UK.
Statistical Shape Analysis of the Human Ear Canal with Application to In-the-Ear Hearing Aid Design

This thesis is about the statistical shape analysis of the human ear canal with application to the mechanical design of in-the-ear hearing aids. Initially, it is described how a statistical shape model of the human ear canal is built based on a training set of laser-scanned ear impressions. A thin plate spline based approach creates a dense correspondence
between the shapes in training set. In addition, a new flexible, non-rigid registration framework is proposed and used to optimise the correspondence field. The framework is based on Markov Random Field regularisation and is motivated by prior work on image restoration. It is shown how the method significantly improves the shape model. In the second part of the thesis, the shape model is used in software tools that mimic the skills of the expert hearing aid makers. The first result is that it is possible to learn an algorithm to cut an ear canal in order to produce an optimal in-the-ear hearing aid. Secondly, a framework for component placement using a coupling of stochastic optimisation and the results from the shape model is proposed. It is successfully, used to place the so-called faceplate with associated component on in-the-ear hearing aids. In addition, the idea of one-size-fits-most shells is explored. In Danish: Denne afhandling beskriver brugen af statistisk formanalyse af den menneskelige hørekanal i det mekaniske design af i-øret høreapparater. Først beskrives det hvordan en statistisk formmodel af den menneskelige øre- kanal er lavet på baggrund af et træningssæt af laser-skannede øre aftryk. En Thin Plate Spline baseret metode genererer en kompakt korrespondance mellem formerne i træningssættet. Endvidere er en fleksibel, ikke-rigid registrerings metode foreslået og brugt til at optimere korrespondance feltet. Metoden er baseret på Markov Random Field regulering og er motiveret af tidligere arbejde vedrørende billede opretning. Det er vist hvordan metoden signifikant forbedrer formmodellen. I den anden del af afhandlingen, bruges formmodellen i programmer, der efterligner evnerne hos de bedste af dem der laver høreapparater. Det første resultat er, at det er muligt at lære en algoritme at skære en ørekanal for at producere et optimalt i-øret høreapparat. Derudover er ideen om en skal af en størrelse og form, som passer de fleste forfulgt.

General information
State: Published
Organisations: Image Analysis and Computer Graphics, Department of Informatics and Mathematical Modeling, Department of Acoustic Technology
Authors: Paulsen, R. R. (Intern), Conradsen, K. (Intern), Laugesen, S. (Intern), Larsen, R. (Intern)
Publication date: Nov 2004

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions: imm3196.pdf
Links:
Source: orbit
Source-ID: 154834
Publication: Research › Ph.D. thesis – Annual report year: 2004

Differences in directional sound source behavior and perception between assorted computer room models
Source directivity is an important input variable when using room acoustic computer modeling programs to generate auralizations. Previous research has shown that using a multichannel anechoic recording can produce a more natural sounding auralization, particularly as the number of channels is increased [J. H. Rindel, F. Otondo, and C. L. Christensen, Proceedings of the International Symposium on Room Acoustics: Design and Science 2004, Paper V01 (2004)]. Further studies evaluating the quality of auralizations using one-channel, four-channel, and 13-channel anechoic recordings have been pursued. The effect of changing the room's material properties was studied in relation to turning the source around 180 deg and on the range of acoustic parameters from the four- and 13 beams. As the room becomes increasingly diffuse, the importance of the modeled directivity decreases when considering reverberation time. However, for the three other parameters evaluated (sound-pressure level, clarity index, and lateral fraction), the changing diffusivity of the room does not diminish the importance of the directivity. The study therefore shows the importance of considering source directivity when using computer modeling. [Work supported by the National Science Foundation.]
Semi-blind Source Separation Using Head-related Transfer Functions

General information
State: Published
Organisations: Cognitive Systems, Department of Informatics and Mathematical Modeling, Department of Acoustic Technology
Authors: Pedersen, M. S. (Intern), Hansen, L. K. (Intern), Kjems, U. (Intern), Rasmussen, K. B. (Intern)
Publication date: 2004
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 201259
Publication: Research › Poster – Annual report year: 2004

Active control of loudspeakers: An investigation of practical applications

General information
State: Published
Organisations: Department of Electrical Engineering, Acoustic Technology, Department of Acoustic Technology
Authors: Bright, A. P. (Intern), Jacobsen, F. (Intern), Polack, J. (Intern), Rasmussen, K. B. (Intern)
Publication date: Nov 2002

Publication Information
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
60678_Orsted2002_Andrew Bright-Active control of loudspeakers-An investigation of practical applications.pdf
Source: orbit
Source-ID: 60678
Publication: Research › Ph.D. thesis – Annual report year: 2002

International hearing protector standardization

Hearing protectors shall fulfill some minimum requirements to their performance. As hearing protector manufacturers sell the products all over the world, the testing and certification of hearing protectors has become an international issue. The ISO working group WG17 under the headlines Acoustics, Noise, produce hearing protector standards to be used at an international level. The presentation will cover the ongoing work in WG17, including the revision of existing standards (ISO 4869-1, ISO 4869-3), upcoming new standards (ISO 4869-7) and the plans and status for future standards (performance in impulse noise, protectors with active noise reduction). Furthermore, an overview of the present European standards (CEN) and the relation to American and Australian/New Zealand standards will be discussed.

General information
State: Published
Organisations: Hearing Systems, Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Pages: 2293-2293
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication Information
Volume: 112
Issue number: 5
ISSN (Print): 0001-4966
Ratings:
Acoustic concerns related to multicultural societies

Immigration has increased cultural diversity in western societies. The process of integrating immigrants into their host countries can be smoothed if acousticians learn to recognize (1) the acoustic traditions of immigrant cultures and (2) the specific acoustic needs of the new society members. Two related projects are discussed. The "Cahrisma" project (Conservation of Acoustical Heritage by the Revival and Identification of the Sinan's Mosque Acoustics) is sponsored by the European Commission and carried out in cooperation among researchers in Turkey, Malta, Italy, France, Switzerland, and Denmark. Its purpose is to combine visual and acoustical concerns in the identification, conservation, and restoration of architectural heritage. It focuses on the famous Turkish mosques of the Osmanic architect Sinan. Some of the acoustic features of these large domed buildings and of Muslim liturgy will be presented. Another project was conducted by students at the Danish Technical University, who found that speech intelligibility for non-native listeners is much more sensitive to poor speech conditions than for native listeners. Also discussed are the unique features of culturally based urban soundscapes. It is suggested that these soundscapes can provide comfort to recent immigrants by increasing their sense of being "at home."

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Gade, A. C. (Intern)
Pages: 2664-2664
Publication date: 2001
Main Research Area: Technical/natural sciences

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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
Today, the importance of distributing early reflection energy to listeners and performers in concert halls is well understood and accepted—also among architects. Still, implementation in the practical design of a large hall is not easy, partly because we still have difficulties quantifying precisely the demands in detail (how much, how early, and from where) due to limitations in our acoustic knowledge—and often also due to little response from the clients regarding their preferences when decisions between alternative demands must be made. Therefore, in general it is up to the acoustician to decide how far to promote the good cause on the basis of his/her experience, taste, and talent in influencing the decision process. The aural presentation will focus on the current limitations in our knowledge regarding the musicians’ need for early reflections, which is a special challenge in the design of terraced, ”surround” concert halls. In the case of the listeners, knowledge has reached a much higher level, and recent results regarding how room shape influence the objective acoustic parameters monitoring the early energy will be presented.
Validation of an auralization system
The room acoustics program odeon provides auralization using fully filtered binaural room impulse responses, each reflection being filtered through nine octave bands and a set of head-related transfer functions. Using the full filtering scheme allows, in principle, a complete audible presentation of all the properties, time-variant frequency coloration, as well as directional information predicted by the room acoustics program. Two methods of verification have been applied. The first method is based on direct measurements on the impulse responses predicted by odeon, using the room acoustics measuring system dirac in order to verify that the auralization method is actually capable of reproducing the predicted room acoustic parameters. Monaural auralization filters were used for this purpose. The other method is an audible comparison between in situ recordings of a singing person in real rooms and the odeon auralization of the same situations. The latter verification is part of an ongoing European research project, CAHRISMA, on restoration of the acoustics in old Byzantine churches and mosques in Istanbul.
A comparison of multifunction device designs

General Information
State: Published
Organisations: Department of Acoustic Technology
Authors: Bright, A. (Intern), Greuet, J. (Ekstern), Backman, J. (Ekstern)
Publication date: 2000

Host publication Information
Title of host publication: A comparison of multifunction device designs
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 264230

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Source: orbit
Source-ID: 264230
Publication: Research - peer-review › Journal article – Annual report year: 2001
An elementary introduction to applied signal analysis

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern)
Number of pages: 44
Publication date: 2000

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 173621
Publication: Research - peer-review › Book – Annual report year: 2000

Annoyance of low frequency noise and traffic noise

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Mortensen, F. R. (Intern), Poulsen, T. (Intern)
Pages: 125-128
Publication date: 2000

Host publication information
Title of host publication: Proc., 9th Int. Meeting on Low Frequency Noise and Vibration
Place of publication: Aalborg
Publisher: Dep. of Acoustics, Aalborg University
Main Research Area: Technical/natural sciences
Conference: 9th International meeting on Low Frequency Noise and Vibration, Aalborg, 01/01/2000
Source: orbit
Source-ID: 175931
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

Auditory comfort on board of trains: passengers’ point of view

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Mzali, M. (Ekstern), Dubois, D. (Ekstern), Polack, J. (Intern), Letourneaux, F. (Ekstern), Poisson, F. (Ekstern)
Pages: 397-402
Publication date: 2000

Host publication information
Title of host publication: Proceedings of Inter-Noise 2000
Place of publication: Nice, France
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176305
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

Calcul de la densité modale d’une cavité rectangulaire par la méthode des orbites: Modal density in a rectangular cavity computed with help of orbits

General information
State: Published
Organisations: Department of Acoustic Technology, Laboratoire d’Acoustique Musicale - Paris 6
Authors: Polack, J. (Intern), Coenca, J. (Ekstern)
Ear, Hearing and Speech: A short introduction

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Publication date: 2000

Efficient acoustic BEM calculations on axisymmetric bodies with non-axisymmetric fields using elliptic integrals and FFT

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jensen, M. S. (Intern), Juhl, P. M. (Ekstern)
Pages: 2580-2583
Publication date: 2000

Etude des paramètres de la réverbération en champ diffus: Comparaison de trois représentations temps-fréquence

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Polack, J. (Intern)
Publication date: 2000
Event: Paper presented at 5th Congrès Français d'Acoustique 2000, Lausanne, Switzerland.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174909
Publication: Research - peer-review › Paper – Annual report year: 2000

Measurements of vibration of a thin annular plate

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern)
Number of pages: 9
Publication date: 2000
Modelling of visco-thermal damping in condenser microphones

New ISO standards for hearing protectors (A)

Working Group 17 under ISO/TC43/SC1 deals with measurement of hearing protector attenuation. WG17 is presently involved in revision of the present 4869-1 standard (especially sound field requirements and reproducibility estimations) and formulation of a new standard where inexperienced hearing protector users are mandatory as test subjects. The latter procedure has recently been introduced in the USA, Australia, and New Zealand. Both the present and the new standard use the Real Ear At Threshold (REAT) method. Results from investigations of the sound field in different test environments will be presented and the status of coming standards for impulse noise and for devices with active noise control will be mentioned.
Numerical computation of sound propagation over a noise screen

**General information**
State: Published
Organisations: Department of Acoustic Technology, Delft University of Technology
Authors: Salomons, E. M. (Ekstern), Rasmussen, K. B. (Intern)
Pages: 327-341
Publication date: 2000
Main Research Area: Technical/natural sciences

**Publication information**
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BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.33 SJR 0.89 SNIP 1.651
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.699 SNIP 1.757 CiteScore 1.85
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.686 SNIP 1.918 CiteScore 1.67
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.828 SNIP 2.356 CiteScore 1.64
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.8 SNIP 2.183 CiteScore 1.66
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.835 SNIP 1.807 CiteScore 1.38
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.702 SNIP 1.494
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.821 SNIP 1.498
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.725 SNIP 1.801
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.685 SNIP 1.296
Prediction of medium frequency vibration by wave intensity analysis

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Nishino, H. (Intern), Ohlrich, M. (Intern)
Publication date: 2000

Host publication information
Title of host publication: Proceedings of International Conference on Noise & Vibration Pre-design and Characterisation using Energy Methods (NOVEM 2000)
Place of publication: Lyon, France
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176300
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

Prediction of random errors in sound intensity measurement

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern)
Pages: 173-178
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: International Journal of Acoustics and Vibration
Volume: 5
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.259 SNIP 0.685 CiteScore 0.55
Propagation of sound waves in ducts

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern)
Number of pages: 68
Publication date: 2000

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 170464
Publication: Research - peer-review › Book – Annual report year: 2000

Quality of acoustical comfort in trains: semantic analysis of open questionnaire

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Mzali, M. (Ekstern), Polack, J. (Intern), Letourneaux, F. (Ekstern), Poisson, F. (Ekstern)
Pages: 407-410
Publication date: 2000

Host publication information
Title of host publication: Proceedings of Congrés Français d'Acoustique 2000
Place of publication: Lausanne, France
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176306
Radiation efficiencies of orthotropic plates

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
- Authors: Hugin, T. (Ekstern), Ohlrich, M. (Intern)
- Publication date: 2000

**Host publication information**
- Title of host publication: Proceedings of International Conference on Noise & Vibration Pre-design and Characterisation using Energy Methods (NOVEM 2000)
- Place of publication: Lyon, France
- Main Research Area: Technical/natural sciences

Random errors revisited

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
- Authors: Jacobsen, F. (Intern)
- Pages: 3401-3408
- Publication date: 2000

**Host publication information**
- Title of host publication: Proceedings of Seventh International Congress on Sound and Vibration
- Place of publication: Auburn, AL, USA
- Publisher: International Institute of Acoustics and Vibration
- Main Research Area: Technical/natural sciences
- Conference: 7th International Congress on Sound and Vibration, Garmisch-Partenkirchen, Germany, 04/07/2000 - 04/07/2000

Reverberation parameters in diffuse fields: comparing three time-frequency distributions

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
- Authors: Baskin, A. (Ekstern), Polack, J. (Intern)
- Publication date: 2000

**Host publication information**
- Title of host publication: Proceedings of Congres Français d’Acoustique 2000
- Place of publication: Lausanne, Switzerland
- Main Research Area: Technical/natural sciences

Sound intensity

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
Sound power radiated by sources in diffuse fields

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Polack, J. (Intern)
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: AES Preprint
Original language: English
Source: orbit
Source-ID: 174911
Publication: Research › Journal article – Annual report year: 2000

Sound source reconstruction using inverse sound field calculations

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Schuhmacher, A. (Intern)
Number of pages: 255
Publication date: 2000

Publication information
Place of publication: Lyngby, Denmark
Publisher: Department of Acoustic Technology, Technical University of Denmark
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176294
Publication: Research - peer-review › Book – Annual report year: 2000

Studies of outdoor sound over complex terrain

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Pages: 211-216
Publication date: 2000

Host publication information
Title of host publication: Proceedings of Inter-Noise 2000
Place of publication: Nice, France
Main Research Area: Technical/natural sciences
Source: orbit
Studies of the effect of screens and earth berms under the influence of wind

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Publication date: 2000

Host publication information
Title of host publication: Proceedings of 9th International Symposium on Long Range Sound Propagation
Place of publication: Den Haag, Netherlands
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176309
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

Subjective relevance of objective measures for spatial impression (A)
Several objective measures have been proposed to describe the feeling of spatial impression in concert halls, including Lateral Energy Fraction (LF) and Interaural Cross-Correlation Coefficient (IACC). However, previous studies have shown that LF and IACC values did not highly correlate with each other at individual seat positions in real halls [J. S. Bradley, J. Acoust. Soc. Am. 96, 3525–3535 (1994)]. To investigate the listener envelopment aspect of spatial impression further, subjective paired-comparison tests have been run using signals which have various values for LF, early IACC (from 5–80 ms), late IACC (from 80 ms–1 s), and late lateral relative sound level (GLL). Another proposed measure, called Interaural Level Fluctuations (IALF), has also been included, which is based on the rate of change over time of the level difference between the ears. The binaural test signals were generated by the room acoustics simulation program ODEON, using four different musical motifs, and were presented to test subjects via headphones. Results from the experiments are presented. [Work supported by ASA Hunt Postdoctoral Research Fellowship.]
The binaural free field hearing threshold for pure tones from 125 Hz to 16 kHz

General information
State: Published
Organisations: Department of Acoustic Technology, Oticon A/S
Authors: Poulsen, T. (Intern), Han, L. A. (Ekstern)
Pages: 333-337
The coherence of reverberant sound fields

A new method of measuring spatial correlation functions in reverberation rooms is presented. It is shown that the coherence functions determined with appropriate spectral resolution contain the same information as the corresponding correlation functions, and that measuring such coherence functions is a far more efficient way of obtaining this information. The technique is then used to verify theoretical predictions of the spatial correlation between various components of the particle velocity in a diffuse sound field. Other possible applications of the technique are discussed and illustrated with experimental results obtained in an ordinary room.
Vibrational source strength as a prerequisite for response prediction by SEA

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern)
Publication date: 2000

Host publication information
Title of host publication: Proceedings of International Conference on Noise & Vibration Pre-design and Characterisation using Energy Methods (NOVEM 2000)
Place of publication: Lyon, France
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176293
Publication: Research - peer-review › Journal article – Annual report year: 2000

Vibration behaviour of single-suspension electrodynamic loudspeakers

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Bright, A. (Intern)
Publication date: 2000

Host publication information
Title of host publication: Vibration behaviour of single-suspension electrodynamic loudspeakers
Main Research Area: Technical/natural sciences
Vibro-acoustic simulation using geometrical acoustics in the medium frequency range inside a car cavity

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Floch, C. (Ekstern), Bardot, A. (Ekstern), Polack, J. (Intern), Bohineust, X. (Ekstern)
Pages: 3853-3856
Publication date: 2000

Host publication information
Title of host publication: Proceedings of Inter-Noise 2000
Place of publication: Nice, France
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176307
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

A comparison of inverse boundary element method and near-field acoustical holography

General information
State: Published
Organisations: Department of Acoustic Technology, Brüel & Kjær A/S, Continental AG
Authors: Schuhmacher, A. (Intern), Hald, J. (Ekstern), Saemann, E. (Ekstern)
Date: 1999

Host publication information
Title of host publication: Proceedings from Sixth International Congress on Sound and Vibration
Place of publication: Copenhagen
Main Research Area: Technical/natural sciences
Conference: 6th International Congress on Sound and Vibration, Kgs. Lyngby, Denmark, 05/07/1999 - 05/07/1999
Source: orbit
Source-ID: 175384
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Acoustic Horns

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 7
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 172487
Publication: Research - peer-review › Book – Annual report year: 1999

Acoustic quality and sound insulation between dwellings

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Acoustique des salles: aspects physiques et perceptifs: Physical and perceptive aspects in Room Acoustics

Active control of noise radiation from vibrating structures

An approach to global equalisation in a rectangular room at low frequencies
An MLS coherence function and its performance in measurements on time-varying systems

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Liu, J. (Intern), Jacobsen, F. (Intern)
Pages: 2851-2858
Publication date: 1999

Host publication information
Title of host publication: Proceedings of Sixth International Congress on Sound and Vibration
Place of publication: Lyngby
Publisher: Department of Acoustic Technology, Technical University of Denmark
Main Research Area: Technical/natural sciences
Conference: 6th International Congress on Sound and Vibration, Kgs. Lyngby, Denmark, 05/07/1999 - 05/07/1999
Source: orbit
Source-ID: 172279
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Attenuation and damping of structure-borne sound: Applied signal analysis

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern)
Number of pages: 4
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174602
Publication: Research - peer-review › Book – Annual report year: 1999

Attenuation and damping of structureborne sound: Power input, vibration and sound radiation for a box shaped plate structure

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern)
Number of pages: 5
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174671
Publication: Research - peer-review › Book – Annual report year: 1999

Auditory Models and Non-linear Hearing Instruments

General information
State: Published
Organisations: Department of Acoustic Technology, Odense University Hospital, Copenhagen University Hospital
Can reverberation enhancement systems change perception of other room acoustic aspects than just reverberation?

Comodulation masking release in bit-rate reduction systems

It has been suggested that the level dependence of the upper masking slope be utilized in perceptual models in bit-rate reduction systems. However, comodulation masking release (CMR) phenomena lead to a reduction of the masking effect when a masker and a probe signal are amplitude modulated with the same frequency. In bit-rate reduction systems the masker would be the audio signal and the probe signal would represent the quantization noise. Masking curves have been determined for sinusoids and 1-Bark-wide noise maskers in order to investigate the risk of CMR, when quantizing depths are fixed in accordance with psycho-acoustical principles. Masker frequencies of 500 Hz, 1 kHz, and 2 kHz have been investigated, and the masking of pure tone probes has been determined in the first four 1/3 octaves above the masker. Modulation frequencies between 6 and 20 Hz were used with a modulation depth of 0.75. A CMR of up to 10 dB was obtained at a distance of 6 Bark above the masker. The amount of CMR was found to depend on the presentation level of the masker; a higher masker level leads to a higher CMR effect. Hence, the risk of CMR affecting the subjective performance of bit-rate reduction systems cannot be ruled out.
Comodulation masking release in bit-rate reduction systems

It has been suggested that the level dependence of the upper masking slope be utilised in perceptual models in bit-rate reduction systems. However, comodulation masking release (CMR) phenomena lead to a reduction of the masking effect when a masker and a probe signal are amplitude modulated with the same frequency. In bit-rate reduction systems the masker would be the audio signal and the probe signal would represent the quantization noise. Masking curves have been determined for sinusoids and 1-Bark-wide noisemaskers in order to investigate the risk of CMR, when quantizing depths are fixed in accordance with psycho-acoustical principles. Masker frequencies of 500Hz, 1kHz and 2kHz have been investigated, and the masking of pure tone probes has been determined in the first four 1/3 octaves above the masker. Modulation frequencies between 6Hz and 20Hz were used with a modulation depth of 0.75. CMR of up to 10dB was obtained at a distance of 6 Bark above the masker. The amount of CMR was found to depend on the presentation level of the masker; a higher masker level leads to a higher CMR-effect. Hence, the risk of CMR affecting the subjective performance of bit-rate reduction systems cannot be ruled out.

Comparisons between computer simulations of room acoustical parameters and those measured in concert halls

A number of European concert halls were surveyed in 1989. In this paper comparisons are made between measured room acoustical parameters and those obtained from computer simulations on concert halls using the odeon program version 3.1. The key parameter compared with measured data is the reverberation time, and this is mainly used to adjust the absorption data of the surfaces in the computer model. But five additional parameters are calculated and compared with measured data as well. In order to determine the sensitivity of the computer model, comparisons are also made between the results obtained from computer simulations using models with a high geometrical fidelity and those from models with simplifications to geometry that are in better agreement with the laws of high-frequency modeling.

General information
State: Published
Organisations: Department of Acoustic Technology, Oticon A/S
Authors: Vestergaard, M. D. (Ekstern), Rasmussen, K. B. (Intern), Poulsen, T. (Intern)
Number of pages: 4
Publication date: 1999

Host publication information
Title of host publication: Acta Acustica Supplement 1 : Collected Papers
Publisher: S. Hirzel
Main Research Area: Technical/natural sciences
Conference: 137th Regular Meeting of the Acoustical Society of America, 2nd Convention of the European Acoustics Association, Berlin, Germany, 15/03/1999 - 15/03/1999
Source: orbit
Source-ID: 172488
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Comparisons between computer simulations of room acoustical parameters and those measured in concert halls

A number of European concert halls were surveyed in 1989. In this paper comparisons are made between measured room acoustical parameters and those obtained from computer simulations on concert halls using the odeon program version 3.1. The key parameter compared with measured data is the reverberation time, and this is mainly used to adjust the absorption data of the surfaces in the computer model. But five additional parameters are calculated and compared with measured data as well. In order to determine the sensitivity of the computer model, comparisons are also made between the results obtained from computer simulations using models with a high geometrical fidelity and those from models with simplifications to geometry that are in better agreement with the laws of high-frequency modeling.

General information
State: Published
Organisations: Department of Acoustic Technology, Department of Electrical Engineering
Authors: Rindel, J. H. (Intern), Shiokawa, H. (Ekstern), Christensen, C. L. (Intern), Gade, A. C. (Intern)
Pages: 1173-1173
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Volume: 105
Issue number: 2
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Comparisons between Computer Simulations of Room Acoustical Parameters and those Measured in Concert Halls

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern), Shiokawa, H. (Intern), Christensen, C. L. (Intern), Gade, A. C. (Intern)
Number of pages: 4
Publication date: 1999

Host publication information
Title of host publication: Collected Papers from the Joint Meeting "Berlin 99"
Place of publication: Berlin
Publisher: Deutsche Gesellschaft für Akustik
Main Research Area: Technical/natural sciences
Conference: 137th Regular Meeting of the Acoustical Society of America, 2nd Convention of the European Acoustics Association, Berlin, Germany, 15/03/1999 - 15/03/1999
Source: orbit
Source-ID: 174842
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

EA Interlaboratory Comparison Ac1: Measurement of Sound Calibrators

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. (Intern)
Number of pages: 38
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 175025
Publication: Research - peer-review › Report – Annual report year: 1999

Excercise in digital audio

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 4
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 172486
Publication: Research - peer-review › Book – Annual report year: 1999

Experience from co-operation between the Department of Acoustic Technology, Technical University of Denmark, and Bang and Olufsen A/S, Struer, Denmark

General information
State: Published
Organisations: Department of Acoustic Technology, Bang & Olufsen A/S
Authors: Bech, S. (Ekstern), Pedersen, O. J. (Intern)
Hearing ability in Danish symphony orchestra musicians

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Obeling, L. (Ekstern), Poulsen, T. (Intern)
Pages: 43-49
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Noise & Health
Volume: 2
Issue number: Jan-Mar
Ratings:
Web of Science (2018): Indexed yes
Web of Science (2017): Indexed yes
Scopus rating (2016): CiteScore 2.03 SNIP 1.169 SJR 0.707
Scopus rating (2015): CiteScore 1.98 SNIP 1.223 SJR 0.575
Scopus rating (2014): CiteScore 2.02 SNIP 1.099 SJR 1.175
Scopus rating (2013): CiteScore 1.77 SNIP 1.614 SJR 0.743
Scopus rating (2012): CiteScore 1.71 SNIP 1.166 SJR 0.679
Scopus rating (2011): CiteScore 1.37 SNIP 1.212 SJR 0.662
Scopus rating (2010): SNIP 0.757 SJR 0.499
Scopus rating (2009): SNIP 1.493 SJR 0.618
Scopus rating (2008): SNIP 0.873 SJR 0.341
Scopus rating (2007): SNIP 1.052 SJR 0.439
Scopus rating (2006): SNIP 0.938 SJR 0.384
Scopus rating (2005): SNIP 0.908 SJR 0.407
Scopus rating (2004): SNIP 0.668 SJR 0.292
Scopus rating (2003): SNIP 0.843 SJR 0.257
Original language: English
Source: orbit
Source-ID: 172309
Publication: Research - peer-review › Journal article – Annual report year: 1999

Høreværn med særligt henblik på musikere og publikum (In Danish)
Influence of sensory interactions between vision and audition on the perceptual characterisation of room acoustics.

General Information
State: Published
Organisations: Department of Acoustic Technology, Laboratoire d’Acoustique de l’Université du Maine, IRCAM, Paris, Universite de Cergy-Pontoise
Authors: Nathanail, C. (Ekstern), Lavandier, C. (Ekstern), Polack, J. (Intern), Warusfel, O. (Ekstern)
Pages: 1046
Publication date: 1999
Conference: 137th Regular Meeting of the Acoustical Society of America, 2nd Convention of the European Acoustics Association, Berlin, Germany, 15/03/1999 - 15/03/1999
Main Research Area: Technical/natural sciences

Publication Information
Volume: 105
Issue number: 2,2
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
In-situ estimation of structural power transmission from machinery source installations

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern)
Pages: 2149-2160
Publication date: 1999

Host publication information
Title of host publication: Proceedings of the Sixth International Congress on Sound and Vibration
Place of publication: Auburn, AL
Publisher: The International Institute of Acoustics and Vibration
Main Research Area: Technical/natural sciences
Conference: 6th International Congress on Sound and Vibration, Kgs. Lyngby, Denmark, 05/07/1999 - 05/07/1999
Source: orbit
Source-ID: 174481
Publication: Research - peer-review › Journal article – Annual report year: 1999

Is there a systematic disagreement between intensity-based and pressure-based sound transmission loss measurements?

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Machimbarrena, M. (Intern), Jacobsen, F. (Intern)
Pages: 101-111
Lydrefleksierende flater

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Number of pages: 8
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176201
Publication: Research - peer-review › Report – Annual report year: 1999

Lydregulering i rom med tilhørere

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Number of pages: 8
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176200
Publication: Research - peer-review › Report – Annual report year: 1999

Lydspredende flater (diffusorer): Byggforskserien 543.424

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Number of pages: 8
Publication date: 1999

Publication information
Place of publication: Oslo
Publisher: Norges Byggforskningsinstitutt
Original language: Undefined/Unknown
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174881
Publication: Research - peer-review › Book – Annual report year: 1999

Measurement of structural input power from multi-point connected sources
Modeling huge sound sources in a room acoustical calculation program

A room acoustical model capable of modeling point sources, line sources, and surface sources is presented. Line and surface sources are modeled using a special ray-tracing algorithm detecting the radiation pattern of the surfaces of the room. Point sources are modeled using a hybrid calculation method combining this ray-tracing method with image source modeling. With these three source types it is possible to model huge and complex sound sources in industrial environments. Compared to a calculation with only point sources, the use of extended sound sources is shown to improve the agreement with measured data.
Modelling Large sound sources in a room acoustical calculation program

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Christensen, C. L. (Intern)
Publication date: 1999

Host publication information
Title of host publication: Modelling Large sound sources in a room acoustical calculation program
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174090
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999
Modelling of horn-type loudspeakers for outdoor sound reinforcement systems

A waveguide oriented numerical simulation model for horn loudspeakers has been developed. The model is able to predict the output from horns with square openings under general conditions. The primary resonance of the driver is included in the simulations and comparison with measurements on two horn-type loudspeakers is made. The agreement between measured and calculated results is very good provided that a sufficient number of modes is included in the simulation. Simulation models of this kind represent one of the first steps towards a CAD tool for outdoor sound reinforcement systems.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Schuhmacher, A. (Intern), Rasmussen, K. B. (Intern)
Pages: 25-37
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Applied Acoustics
Volume: 56
Issue number: 1
ISSN (Print): 0003-682X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.33 SJR 0.89 SNIP 1.651
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.699 SNIP 1.757 CiteScore 1.85
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.686 SNIP 1.918 CiteScore 1.67
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.828 SNIP 2.356 CiteScore 1.64
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.8 SNIP 2.183 CiteScore 1.66
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.835 SNIP 1.807 CiteScore 1.38
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.702 SNIP 1.494
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.821 SNIP 1.498
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.725 SNIP 1.801
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.685 SNIP 1.296
Web of Science (2007): Indexed yes
MP.EXE Microphone pressure sensitivity calibration calculation program: Version 3.00, User Manual

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. (Intern)
Number of pages: 66
Publication date: 1999

Numerical transducer modelling

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Cutanda, V. (Intern)
Pages: 563-570
Publication date: 1999


General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Christensen, C. L. (Intern)
Number of pages: 76
On the applicability of models for outdoor sound

The suitable prediction model for outdoor sound fields depends on the situation and the application. Computationally intensive methods such as parabolic equation methods, FFP methods, and boundary element methods all have advantages in certain situations. These approaches are accurate and predict not only sound pressure levels but also phase information. Such methods are, however, not always able to predict the sound field for more complicated scenarios involving terrain features, atmospheric wind and temperature gradients, and turbulence. Another class of methods is based upon approximate theory—such methods are inherently less accurate but generally faster in computation and may also provide results for complicated scenarios. The accuracy of different approaches in realistic situations is discussed based upon measured and simulated data.

On the applicability of models for outdoor sound (A)

The suitable prediction model for outdoor sound fields depends on the situation and the application. Computationally intensive methods such as parabolic equation methods, FFP methods, and boundary element methods all have advantages in certain situations. These approaches are accurate and predict not only sound pressure levels but also phase information. Such methods are, however, not always able to predict the sound field for more complicated scenarios involving terrain features, atmospheric wind and temperature gradients, and turbulence. Another class of methods is based upon approximate theory—such methods are inherently less accurate but generally faster in computation and may also provide results for complicated scenarios. The accuracy of different approaches in realistic situations is discussed based upon measured and simulated data.
On the relation between peripheral compression and the growth of loudness
This presentation reviews similarities and differences between normal listeners' pure-tone loudness functions and the compressive basilar-membrane, BM, input-output function. Loudness matches between pure tones and multitone
complexes with widely separated components reveal that the loudness function can be modeled by a modified power function with local exponents around unity near threshold and 0.2 at moderate levels [S. Buus et al., J. Acoust. Soc. Am. 104, 399–410 (1998)]. Loudness matches between short and long tones show that the SPL difference at equal loudness is a nonmonotonic function of SPL and is largest at moderate levels [S. Buus et al., J. Acoust. Soc. Am. 101, 669–680 (1997)]. These data can be explained by a loudness function that is flattest at moderate levels, where its local exponent also is around 0.2. This value is close to that obtained for BM input-output functions. The steepening of the loudness function at low levels is qualitatively similar to BM measurements. The steepening at high levels is absent in BM data when the state of the animals' cochleae is carefully controlled. One possible explanation is that the cochleae of normal adult listeners are in worse condition than those of carefully treated animals. [Work supported by NIH/NIDCD.]
On the sound field requirements in the hearing protector standard ISO 4869-1

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jensen, N. S. (Ekstern), Poulsen, T. (Intern)
Pages: 825-831
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication Information
Journal: Acustica
Volume: 85
ISSN (Print): 0001-7884
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2004): SJR 0.585 SNIP 2.135
Scopus rating (2003): SJR 0.464 SNIP 1.995
Scopus rating (2002): SJR 0.358 SNIP 1.307
Scopus rating (2001): SJR 0.279 SNIP 0.533
Scopus rating (2000): SJR 0.418 SNIP 0.761
Scopus rating (1999): SJR 0.514 SNIP 1.017
Original language: English
Source: orbit
Source-ID: 172728
Publication: Research - peer-review › Journal article – Annual report year: 1999
Outdoor Acoustics as a General Discipline

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Pages: 637-644
Publication date: 1999

Host publication information
Title of host publication: Proceedings of the Sixth International Congress on Sound and Vibration
Main Research Area: Technical/natural sciences
Conference: 6th International Congress on Sound and Vibration, Kgs. Lyngby, Denmark, 05/07/1999 - 05/07/1999
Source: orbit
Source-ID: 172742
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Overview of research and educational matters in Denmark
An overview is given about the present and near future situation in Denmark concerning research and educational matters with relation to psychoacoustics. The overview is with emphasis on the Technical University of Denmark and an example of industry-university collaboration is given.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Pages: 615-618
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Acustica
Volume: 85
Issue number: 5
ISSN (Print): 0001-7884
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2004): SJR 0.585 SNIP 2.135
Scopus rating (2003): SJR 0.464 SNIP 1.995
Scopus rating (2002): SJR 0.358 SNIP 1.307
Scopus rating (2001): SJR 0.279 SNIP 0.533
Scopus rating (2000): SJR 0.418 SNIP 0.761
Scopus rating (1999): SJR 0.514 SNIP 1.017
Original language: English
Source: orbit
Source-ID: 173194
Publication: Research - peer-review › Conference article – Annual report year: 1999

Perception and meaning of warning signals in urban context

General information
State: Published
Organisations: Department of Acoustic Technology, Laboratoire d'Acoustique Musicale - Paris 6, French National Centre for Scientific Research
Authors: Vogel, C. (Ekstern), Polack, J. (Intern), Castellengo, M. (Ekstern), Dubois, D. (Ekstern)
Pages: 1373
Publication date: 1999
Conference: 137th Regular Meeting of the Acoustical Society of America, 2nd Convention of the European Acoustics Association, Berlin, Germany, 15/03/1999 - 15/03/1999
Main Research Area: Technical/natural sciences

Publication information
Practical application of inverse boundary element method to sound field studies of tyres

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
- Authors: Schuhmacher, A. (Intern)
- Publication date: 1999

**Host publication information**
- Title of host publication: Proceedings of Inter-Noise 99
- Main Research Area: Technical/natural sciences
- Conference: 28th International Congress and Exposition on Noise Control Engineering, Fort Lauderdale, FL, United States, 06/12/1999 - 06/12/1999
- Source: orbit
- Source-ID: 175429
- Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Proceedings of Sixth International Congress on Sound and Vibration

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
- Authors: Jacobsen, F. (Intern)
- Publication date: 1999

**Publication information**
- Place of publication: Auburn, AL, USA
- Publisher: International Insitut of Acoustic and Vibration
- Main Research Area: Technical/natural sciences
- Source: orbit
- Source-ID: 176251
- Publication: Research - peer-review › Book – Annual report year: 1999

Psykoakustiske målemetoder/Psychoacoustic measuring methods

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
- Authors: Poulsen, T. (Intern)
- Number of pages: 49
- Publication date: 1999

**Publication information**
- Original language: Danish
- Main Research Area: Technical/natural sciences
- Source: orbit
- Source-ID: 165963
- Publication: Research - peer-review › Book – Annual report year: 1999

Radiation from a lined duct in uniform flow

**General information**
- State: Published
- Organisations: Department of Acoustic Technology
- Authors: Juhl, P. M. (Intern)
Recent multi-purpose hall designs in Denmark with physically variable acoustics

This paper describes two recent Danish multi-purpose hall designs, in which acoustic variability has been accomplished in different ways: through variable absorption and variable volume, respectively. The different approaches were chosen in order to insure that not only reverberation time (T) and so clarity (C), but also the strength parameter (G) could be varied in a favorable direction in view of the prescribed uses of the halls. The hall with variable absorption is the assembly hall in the new extension to the Royal Library in Copenhagen to open in fall 1999. This hall will seat 600 people and be used for chamber music concerts, symphony orchestra rehearsals, and amplified speech. For the latter two functions, a reduction in G along with reduction in T was considered favorable. The hall with variable volume is the recently opened Esbjerg Musikhus seating 1100 and equipped with a full stage house. This hall is used for symphonic concerts and musicals as well as drama and conferences. In this hall, maintaining or even increasing G along with a reduction in T is advantageous, especially in the drama theatre mode. The paper will describe the design of these two halls along with acoustic measurement results.
Recent Multipurpose hall designs in Denmark with physically variable acoustics

General Information
State: Published
Organisations: Department of Acoustic Technology, Jordan Akustik
Authors: Gade, A. C. (Intern), Jordan, N. V. (Ekstern)
Publication date: 1999

Host publication Information
Title of host publication: Recent Multipurpose hall designs in Denmark with physically variable acoustics
Main Research Area: Technical/natural sciences
Conference: 137th Regular Meeting of the Acoustical Society of America, 2nd Convention of the European Acoustics Association, Berlin, Germany, 15/03/1999 - 15/03/1999
Source: orbit
Simple rules for design of exhaust mufflers and a comparison with four-pole and FEM calculations

General information
State: Published
Organisations: Department of Acoustic Technology, Ødegaard & Danneskiold-Samsøe A/S
Authors: Jensen, M. S. (Intern), Ødegaard, J. (Ekstern)
Pages: 399-406
Publication date: 1999

Host publication information
Title of host publication: Proceedings of Sixth International Congress on Sound and Vibration
Place of publication: Lyngby
Publisher: Department of Acoustic Technology, Technical University of Denmark
Main Research Area: Technical/natural sciences
Conference: 6th International Congress on Sound and Vibration, Kgs. Lyngby, Denmark, 05/07/1999 - 05/07/1999
Source: orbit
Source-ID: 173078
Publication: Research - peer-review › Article in proceedings – Annual report year: 1999

Sound field control in a rectangular room at low frequencies to simulate the sound radiated by a virtual source

General information
State: Published
Organisations: Department of Acoustic Technology, Kogakuin University
Authors: Orozco, A. (Intern), Uchiyama, M. (Ekstern), Tohyama, M. (Ekstern)
Pages: 53-60
Publication date: 1999

Host publication information
Title of host publication: Technical Report of IEICE Vol. 98 No 529
Place of publication: Osaka, Japan
Publisher: Institute of Electronics, Information & Communication Engineers
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 173121
Publication: Research › Article in proceedings – Annual report year: 1999

Sound field in long rooms with diffusely reflecting boundaries
A diffusion equation is used to predict the sound propagation in long rooms with diffusely reflecting boundaries. The model is defined by two parameters, the coefficient of diffusion depending on the mean free path, and an exchange coefficient expressing wall absorption. The diffusion equation is solved for time-varying sources and in stationary state. Analytical expressions of the sound attenuation and reverberation in infinite, semi-infinite and finite long rooms are quite in accordance with numerical simulations of diffuse sound field. It is also shown that the diffusion model allows to predict experimental observations: the decay curves are not linear, the reverberation time increases with the source-receiver distance, and sound attenuation is linear along corridors. The dependence of the coefficient of diffusion with the degree of wall diffusion is also discussed.

General information
State: Published
Organisations: Department of Acoustic Technology, Laboratoire d'Acoustique de l'Université du Maine
Authors: Picaut, J. (Ekstern), Simon, L. (Ekstern), Polack, J. (Intern)
Pages: 217-240
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Applied Acoustics
Volume: 56
Issue number: 4
Sources and power transmission

Spatial coherence in reverberant sound fields

Spatially extended sound equalisation in rooms at low frequencies

Stereo recording exercise
To investigate how hearing loss of primarily cochlear origin affects the loudness of brief tones, loudness matches between 5- and 200-ms tones were obtained as a function of level for 15 listeners with cochlear impairments and for seven age-matched controls. Three frequencies, usually 0.5, 1, and 4 kHz, were tested in each listener using a two-interval, two-alternative forced-choice (2I, 2AFC) paradigm with a roving-level, up–down adaptive procedure. Results for the normal listeners generally were consistent with published data [e.g., J. Acoust Soc. Am. 99, 1633–1644 (1996)]. The amount of temporal integration—defined as the level difference between equally loud short and long tones—varied nonmonotonically with level and was largest at moderate levels. No consistent effect of frequency was apparent. The impaired listeners varied widely, but most showed a clear effect of level on the amount of temporal integration. Overall, their results appear...
consistent with expectations based on knowledge of the general properties of their loudness-growth functions and the equal-loudness-ratio hypothesis, which states that the loudness ratio between equal-SPL long and brief tones is the same at all SPLs. The impaired listeners' amounts of temporal integration at high SPLs often were larger than normal, although it was reduced near threshold. When evaluated at equal SLs, the amount of temporal integration well above threshold usually was in the low end of the normal range. Two listeners with abrupt high-frequency hearing losses (slopes >50 dB/octave) showed larger-than-normal maximal amounts of temporal integration (40 to 50 dB). This finding is consistent with the shallow loudness functions predicted by our excitation-pattern model for impaired listeners [in Modeling Sensorineural Hearing Loss, edited by W. Jesteadt (Erlbaum, Mahwah, NJ, 1997), pp. 187–198]. Loudness functions derived from impaired listeners' temporal-integration functions indicate that restoration of loudness in listeners with cochlear hearing loss usually will require the same gain whether the sound is short or long. ©1999 Acoustical Society of America.
The results of a unique Nordic HAKK interlaboratory REAT comparison

The sound-field requirements in the hearing protector standard ISO 4869-1 are under discussion at present and are likely to be changed in a coming revision of the standard. The Nordic HAKK group comprises representatives from the hearing protector industry, labor protection institutes, audiological clinics, and universities. The test facilities at the laboratories of the members of the Nordic HAKK group cover various ways to fulfill the sound-field requirements of the ISO standard. Therefore, a round robin test was initiated with the aim of determining—and comparing between laboratories—the attenuation of two hearing protectors of the muff type and one of the plug type. The measurements were performed during the meetings of the group and with the group members (min. ten) as test subjects, thus permitting one group of subjects to be used by all laboratories. A statistical analysis of the results is in progress at the time of submission of this abstract. All factors (laboratory, protector-type, test-frequency, test-subject) are significant.
The static pressure and temperature coefficients of laboratory standard microphones

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. (Intern)
Pages: 265-273
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Metrologia
Volume: 36
Issue number: 4
Original language: English
Source: orbit
Source-ID: 174990
Publication: Research - peer-review › Journal article – Annual report year: 1999

Time variance effects and measurement error indications for MLS measurements

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Liu, J. (Intern)
Number of pages: 58
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 173065
Publication: Research - peer-review › Report – Annual report year: 1999

A Century of Acoustic Metrology

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. (Intern)
Pages: 35-41
Publication date: 1998

Host publication information
Title of host publication: Proceedings of 5'th Mexican Congress on Acoustics
Place of publication: Querétaro
Publisher: Mexican Institute of Acoustics
Main Research Area: Technical/natural sciences
Conference: 5'th Mexican Congress on Acoustics, Querétaro, 01/01/1998
Source: orbit
Source-ID: 175565
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

Acoustic quality and sound insulation between dwellings
Active vibration control using state space LQG and internal model control methods

General information
State: Published
Organisations: Department of Acoustic Technology, University of Southampton
Authors: Mørkholt, J. (Intern), Elliott, S. (Ekstern)
Pages: 559-564
Publication date: 1998

Host publication information
Title of host publication: Proceedings of Fourth International Conference on Motion and Vibration Control
Place of publication: Zürich
Publisher: Institute of Robotics
Main Research Area: Technical/natural sciences
Conference: Fourth International Conference on Motion and Vibration Control, Zürich, Switzerland, 01/01/1998
Source: orbit
Source-ID: 170818
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

Air conducted and body conducted sound produced by own voice

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Hansen, M. Ø. (Intern)
Pages: 11-19
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Acoustics
Volume: 26(2)
Original language: English
Source: orbit
Source-ID: 171711
Publication: Research - peer-review › Journal article – Annual report year: 1998

A note on the convergence of the direct collocation boundary
An overview of the literature dealing with convergence of boundary element formulations is presented, and an intuitive account of the results is given. The convergence of an axisymmetric boundary element formulation is studied using linear, quadratic or superparametric elements. It is demonstrated how the rate of convergence is reduced for calculations involving bodies with edges, and two methods for improving the rate of convergence are suggested and examined.

General information
State: Published
Organisations: Department of Acoustic Technology
A numerical and experimental investigation of the performance of sound intensity probes at high frequencies

The high-frequency performance of a p-p intensity probe with a solid spacer between the two microphones is examined. It is shown theoretically and verified experimentally that with a spacer length that equals the diameter of the microphones, the finite difference error is almost perfectly cancelled by a cavity resonance. It is concluded that the usable frequency range of sound intensity probes can be doubled with this configuration.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern), Cutanda, V. (Intern), Juhl, P. M. (Intern)
Pages: 953-961
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Volume: 103
Issue number: 2
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
A simple structural power method for determining the vibratory strength of machinery sources

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern)
Pages: 383-388
Publication date: 1998

Host publication information
Title of host publication: Proceedings of
Place of publication: Munich
Publisher: Technische Universität München
Main Research Area: Technical/natural sciences
Conference: 3rd European Conference on Noise Control (Euro-Noise ‘98), Munich, Germany, 01/01/1998
Source: orbit
Source-ID: 170786
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998
Compromises in orchestra pit design: A ten-year trench war in The Royal Theatre, Copenhagen

The "old stage" of The Royal Theatre in Copenhagen—a classical horseshoe theatre with an almost flat audience floor and four balcony levels—is the primary opera and ballet theatre in Denmark. In the early 1980s the orchestra pit was enlarged and its size made flexible. However, in the following years this new flexibility caused a formal battle between the orchestra, the singers, and management, because each group had different interests as to how the pit should be configured for each new production. In the 1990s, increased concern about the musicians' hearing and the increase in the popularity of opera finally opened the way for a new renovation of the pit, which solved most of the problems. The paper describes the many lessons learned during the ten-year period in which the authors were involved with the case as acoustic consultants. Questions of how pit configuration influences mutual hearing and exposure levels in the pit, balance between singers and orchestra as judged by the audience, communication between stage and pit, as well as the influence of pit floor construction on orchestra timbre will all be illustrated by results of numerous objective measurements, subjective surveys, and computer simulations.
Equivalent threshold sound pressure levels for acoustic test signals of short duration.

General information
State: Published
Organisations: Department of Acoustic Technology, Technical Audiological Laboratory
Authors: Poulsen, T. (Intern), Daugaard, C. (Ekstern)
Pages: 245-249
Publication date: 1998

Host publication information
Title of host publication: Proceedings of the NATO Advanced Study Institute on Computational Hearing
Place of publication: Berkeley
Publisher: International Computer Science Institute
Main Research Area: Technical/natural sciences
Conference: NATO ASI on Computational Hearing, II Ciocco, Italy, 01/01/1998
Source: orbit
Source-ID: 169854
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

Equivalent threshold sound pressure levels for Sennheiser HDA 200 earphone and Etymotic Research ER-2 insert earphone in the frequency range 125 Hz to 16 kHz.

General information
State: Published
Organisations: Department of Acoustic Technology, Oticon A/S
Authors: Han, L. A. (Ekstern), Poulsen, T. (Intern)
Pages: 105-112
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Journal: Scandinavian Audiology
Volume: 27
Issue number: 2
ISSN (Print): 0105-0397
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2004): SJR 0.703 SNIP 2.403
Scopus rating (2003): SJR 0.307 SNIP 1.075
Scopus rating (2002): SJR 0.312 SNIP 1.506
Scopus rating (2001): SJR 0.571 SNIP 0.849
Scopus rating (2000): SJR 0.388 SNIP 0.754
Scopus rating (1999): SJR 0.587 SNIP 1.075
Original language: English
Source: orbit
Source-ID: 171208
Publication: Research - peer-review › Journal article – Annual report year: 1998

Experimental low-frequency sound equalization in an extended region of an enclosure using adaptive filters

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Orozco-Santillán, A. (Intern)
Pages: 577
Publication date: 1998
Conference: 104th Convention of the Audio Engineering Society, Amsterdam, Netherlands, 16/05/1998 - 16/05/1998
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of The Audio Engineering Society
Volume: 46
Issue number: 6
Experimental low-frequency sound equalization in an extended region of an enclosure using adaptive filters

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Orozco-Santillán, A. (Intern)
Number of pages: 15
Publication date: 1998
Forsøg på anvendelse af Odeon i undervandsakustisk sammenhæng: Ystad-fjorden, Norge

Fundamentals of outdoor acoustics

Hørelse og Psykoakustik. (In Danish)

Høreværn: Funktion, effekt (In Danish)
Lydopfattelse (In Danish)

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Number of pages: 77
Publication date: 1998

MP.EXE, a Calculation Program for Pressure Reciprocity Calibration of Microphones

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. (Intern)
Pages: 27-33
Publication date: 1998
Main Research Area: Technical/natural sciences

Noise source localization on tyres using an inverse boundary element method

General information
State: Published
Organisations: Department of Acoustic Technology, Continental AG, Brüel & Kjær A/S
Authors: Schuhmacher, A. (Intern), Saemann, E. (Ekstern), Hald, J. (Ekstern)
Publication date: 1998
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 170341
Publication: Research - peer-review › Book chapter – Annual report year: 1998
Occlusion effects, Part II: A study of the occlusion effect mechanism and the influence of the earmould properties

General information
State: Published
Organisations: Department of Acoustic Technology, Department of Electrical Engineering, Hearing Systems, Oticon A/S
Authors: Hansen, M. Ø. (Intern), Poulsen, T. (Intern), Lundh, P. (Ekstern)
Number of pages: 226
Publication date: 1998

Publication information
Publisher: Department of Acoustic Technology, Technical University of Denmark
Volume: Report 73
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
Corrections_to_Occlusion_effects_Part_II.pdf
Occlusion_Effects_Part_II.pdf
Source: orbit
Source-ID: 171767
Publication: Research › Ph.D. thesis – Annual report year: 1998

Odeon Room Acoustics Program version 3.1 - User manual: Industrial, Auditorium and Combined editions

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Christensen, C. L. (Intern)
Number of pages: 57
Publication date: 1998

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 169846
Publication: Research - peer-review › Report – Annual report year: 1998

On the development of approximate models for outdoor sound propagation

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Publication date: 1998

Host publication information
Title of host publication: Proceedings from Eighth International Symposium on Long Range Sound Propagation
Main Research Area: Technical/natural sciences
Conference: Eighth International Symposium on Long Range Sound Propagation, Penn State, University Park, PA, USA, 01/01/1998
Source: orbit
Source-ID: 170164
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

Phase behaviour of transfer functions in vibrating systems

General information
State: Published
Organisations: Department of Acoustic Technology, Shanghai Maritime University
Authors: Zhu, J. (Ekstern), Ohlrich, M. (Intern)
Pages: 244-253
Publication date: 1998
Main Research Area: Technical/natural sciences
Power transmission between two finite beams at low modal overlap

The coupling loss factors frequently used in statistical Energy Analysis are often based on a wave approach that assumes that the transmitted waves returning to the junction are uncorrelated with the directly transmitted waves. This assumption is generally not fulfilled for structures at low frequencies where the response exhibits distinctly well separated resonances. A method is presented here for calculation of an improved coupling loss factor for one-dimensional subsystems. By applying statistical considerations to an analytic expression for the net power transmission it is possible numerically to calculate an average value of the ratio of reflected to incident wave amplitudes at the junction. From this ratio an improved coupling loss factor can be calculated which takes into account the re-radiation and re-injection of power which normally occurs between two reverberant fields. This improved coupling loss factor has the following features: it is valid at low modal overlap, it is independent of the exact boundary conditions, it depends upon the loss factor of the receiving subsystem, and its calculation is not dependent on the strength of the coupling. To illustrate the method, a specific beam system is considered in the frequency range where the modal overlap is small. Coupling loss factors are calculated and are employed in a traditional SEA model to predict mean square velocities for each beam element with good accuracy.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Hugin, C. T. (Intern)
Pages: 829-854
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Sound and Vibration
Volume: 212
Issue number: 5
ISSN (Print): 0022-460X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
Simultaneous measurements of room-acoustic parameters using different measuring equipment?

Often the results from different room-acoustic measurements in the same hall disagree, and the disagreement is just said to be due to different measuring equipment, or different rigging/temperature, etc. The room acoustic of the Oslo Concert Hall was measured simultaneously, using the following different measuring equipment: (1) MLS/MLSSA (Statsbygg), (2) Sweep-Tone (Tech. Univ. Denmark), and (3) Norsonic 840 with MLS+MatLab. For some of the measurements (4) Pistol and (5) Electrical Impulse were also used. The paper will compare the results from the different measuring equipment, for the most known room-acoustic parameters. For the reverberation time parameters RT and EDT, very good agreement was found between the three main measuring equipments. For Ts and C80 the agreement between these three is good/fair for the higher frequencies, but less good for the bass, especially C80. The measurements with Electric Pulse and Pistol as signals (analyzed through Norsonic+MatLab) indicate good agreement for the reverberation times, but EDT is somewhat higher for the Pistol. For Ts and C80 the Electric Impulse and especially the Pistol give less clearness (higher Ts and lower C80), compared to MLSSA, Sweep Tone, and Norsonic/MLS.

General information
State: Published
Organisations: Department of Acoustic Technology, Statsbygg Oslo, Norsonic
Authors: Halmrast, T. (Ekstern), Gade, A. C. (Intern), Winsvold, B. (Ekstern)
Pages: 3034-3034
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Volume: 103
Issue number: 5
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Spatial aspects of reproduced sound in small rooms

This paper reports on the influence of individual reflections on the auditory spatial aspects of reproduced sound. The sound field produced by a single loudspeaker positioned in a normal listening room has been simulated using an electroacoustical synthesis of the direct sound, 17 individual reflections and the reverberant field. The threshold of detection was measured using the method of adjustment for five reflections using three subjects for noise and speech. The thresholds have been measured for two simulated situations (1) a loudspeaker with a frequency independent directivity characteristics and frequency independent absorption coefficients of the room surfaces and (2) a loudspeaker with directivity similar to a standard two-way system and absorption coefficients according to measurements of real materials. The results have shown that subjects can reliably distinguish between timbre and spatial aspect of the sound field, that the spectral energy above 2 kHz of the individual reflection determines the importance of the reflection for the spatial aspects, and that only the first order floor reflection will contribute to the spatial aspects. ©1998 Acoustical Society of America.
The insertion loss of screens under the influence of wind

Point source propagation over a screen located on a finite impedance surface representative of grass-covered ground is investigated under upwind and downwind conditions. The theoretical part of the investigation involves extended use of Parabolic Equation methods (PE) allowing for the changes in the vertical wind speed profile when the wind field passes the screen. The influence of turbulence is also implemented. The experimental part of the investigation relies on a scale model technique based upon a 1:25 scaling ratio and a triggered spark source. The main results relate to the size of the insertion loss of a screen under windy conditions and to the acoustic importance of the redirection of the flow before and after the screen.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern), Arranz, M. G. (Intern)
Pages: 2692-2698
Publication date: 1998
Main Research Area: Technical/natural sciences
The relationship between sound insulation and acoustic quality in dwellings

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Number of pages: 6
Publication date: 1998

Host publication information
Title of host publication: Proceedings of Inter-noise 98, International Congress on Noise Control Engineering
Place of publication: Auckland
Publisher: The New Zealand Acoustical Society
Main Research Area: Technical/natural sciences
Source-ID: 171237
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

The sound power emitted by a source of low acoustic impedance

General information
State: Published
Organisations: Department of Acoustic Technology, Technical University of Denmark
Authors: Jacobsen, F. (Intern), Verholt, L. M. (Ekstern)
Pages: 1361-1364
Publication date: 1998

Host publication information
Title of host publication: Proceedings of Inter Noise 98
Place of publication: Christchurch
Publisher: New Zealand Acoustical Society
Main Research Area: Technical/natural sciences
Source-ID: 170463
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

A Comparison of State Space LQG, Wiener IMC and Polynomial LQG Discrete Time Feedback Control for Active Vibration Control Purposes

General information
State: Published
Organisations: Department of Acoustic Technology, University of Southampton
Authors: Mørkholt, J. (Intern), Elliott, S. (Ekstern), Sors, T. (Ekstern)
A convenient accuracy criterion for time domain FE-calculations

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jensen, M. S. (Intern)
Pages: 793-800
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the Fifth International Congress on Sound and Vibration
Place of publication: Auburn, AL
Publisher: The International Institute of Acoustics and Vibration
Main Research Area: Technical/natural sciences
Conference: 5th International Congress on Sound and Vibration, Adelaide, Australia, 15/12/1997 - 15/12/1997
Source: orbit
Source-ID: 167826
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

Active control of structural vibration using power transmission methods (ASPEN)

General information
State: Published
Organisations: Department of Acoustic Technology, University of Southampton, Centre Technique des Industries Mécaniques
Authors: Elliott, S. (Ekstern), Gardonio, P. (Ekstern), David, A. (Ekstern), Pinnington, R. (Ekstern), Garcia-Bonito, J. (Ekstern), Pavic, G. (Ekstern), Besombes, M. (Ekstern), Henriksen, E. (Intern), Ohlrich, M. (Intern), Laugesen, S. (Intern)
Number of pages: 12
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167759
Publication: Research - peer-review › Report – Annual report year: 1997

Active control of structural vibration using power transmission methods (ASPEN)

General information
State: Published
Organisations: Department of Acoustic Technology, University of Southampton, Centre Technique des Industries Mécaniques
Authors: Elliott, S. (Ekstern), Pavic, G. (Ekstern), Ohlrich, M. (Intern)
Number of pages: 4
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167831
Publication: Research - peer-review › Report – Annual report year: 1997
Active equalisation of the sound field in an extended region of a room

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Orozco-Santillán, A. (Intern)
Pages: 287-294
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the Fifth International Congress on Sound and Vibration
Place of publication: Auburn, AL
Publisher: The International Institute of Acoustics and Vibration
Main Research Area: Technical/natural sciences
Conference: 5th International Congress on Sound and Vibration, Adelaide, Australia, 15/12/1997 - 15/12/1997
Source: orbit
Source-ID: 167954
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

An elementary introduction to applied signal analysis

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern)
Number of pages: 40
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167820
Publication: Research - peer-review › Book – Annual report year: 1997

An introductory study of the convergence of the direct boundary element method

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Juhl, P. M. (Intern)
Pages: 825-832
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the Fifth International Congress on Sound and Vibration
Place of publication: Auburn, AL
Publisher: The International Institute of Acoustics and Vibration
Main Research Area: Technical/natural sciences
Conference: 5th International Congress on Sound and Vibration, Adelaide, Australia, 15/12/1997 - 15/12/1997
Source: orbit
Source-ID: 167827
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

A note on the influence of the averaging time and the frequency resolution on the accuracy of acoustic measurements

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern)
Number of pages: 13
Publication date: 1997
An overview of the sources of error in sound power determination using the intensity technique

An overview of the most important sources of error in sound power determination with the sound intensity technique is presented. It is concluded that the method is convenient, accurate and reliable provided that a few simple rules are observed. (C) 1997 Elsevier Science Ltd.
A Physical Description of the Response of Coupled Beams

An analytical method is presented for computing the vibrational response and the net transmitted power of bending wave fields in a system consisting of coupled finite beams. The method is based on a wave approach that utilises the reflection and transmission coefficients of the different beam joints to couple the elements. These reflection and transmission coefficients are those derived by considering the coupling between the corresponding semi-infinite elements. The predicted results are in almost perfect agreement with exact calculations of the detailed response and net transmitted power. The results are valid for frequencies above which the influence of the reflected near fields for each of the beam elements is negligible. The method is demonstrated on different configurations of beams coupled in extension of each other.
Assessment of airborne and impact noise from neighbours

General information
State: Published
Organisations: Department of Acoustic Technology, Velux A/S
Authors: Rindel, J. H. (Intern), Rasmussen, B. (Ekstern)
Pages: 1739-1744
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the 1997 International Congress on Noise Control Engineering
Place of publication: Budapest
A Study of Simple Diffraction Models

In this paper two simple methods for cabinet edge diffraction are examined. Calculations with both models are compared with more sophisticated theoretical models and with measured data. The parameters involved are studied and their importance for normal loudspeaker box designs is examined.

Bias Errors in Measurement of Vibratory Power and Implication for Active Control of Structural Vibration

Calculation methods for the physical properties of air used in the calibration of microphones

It is suggested that a mutual agreement be obtained among the European metrology laboratories on the procedure used to determine the acoustic properties of humid air when calibrating microphones and reporting the results. A unification of this procedure will ease the comparison of calibration results among the various laboratories. The present report refers the background and presents a proposal for these procedures.
Computer simulation techniques for acoustical design of rooms - How to treat reflections in sound field simulation

Detecting gas leaks by ultrasonic emission

Determination of ETSPLs for the Sennheiser HDA 200 headphone and the Etymotic Research ER-2 insertphone and MAF in the frequency range 125 Hz to 16 kHz
Evaluation of a reverberation enhancement system installed in a small multi purpose hall

After design and installation of a reverberation enhancement system in new 400 seat multi purpose hall in Vejle, Denmark, room acoustic measurements and listening tests were performed in order to reveal the objective and subjective performance and limits of such a powerful tool for altering “room acoustic” properties. The compromises in realistic choice of acoustic parameters for the different settings of the system are described with reference to the natural acoustics and functional needs of the hall in question. Although the enhancement system is capable of increasing the reverberation time by a factor of three, it is found that an increase of about 50% (from 1.1 to 1.7 sec.) is about the limit beyond which critical listeners start complaining about lack of realism. Possible reasons for this are discussed.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Gade, A. C. (Intern)
Pages: 522-529
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Acustica
Volume: 83
Issue number: 3
ISSN (Print): 0001-7884
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2004): SJR 0.585 SNIP 2.135
Scopus rating (2003): SJR 0.464 SNIP 1.995
Scopus rating (2002): SJR 0.358 SNIP 1.307
Scopus rating (2001): SJR 0.279 SNIP 0.533
Scopus rating (2000): SJR 0.418 SNIP 0.761
Scopus rating (1999): SJR 0.514 SNIP 1.017
Original language: English
Source: orbit
Source-ID: 167733
Publication: Research - peer-review › Journal article – Annual report year: 1997

Final Technical Report on Accuracy Limitations of Current Transducers and Implications on Power Measurements in Active Control

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern), Henriksen, E. (Intern)
Number of pages: 6
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167832
Publication: Research - peer-review › Report – Annual report year: 1997

Høreapparater (In Danish)

General information
State: Published
Organisations: Department of Acoustic Technology
Intercomparison test on hearing protectors (EU, VG4)

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Number of pages: 10
Publication date: 1997

Loudness of brief tones in listeners with normal hearing and sensorineural hearing loss

General information
State: Published
Organisations: Department of Acoustic Technology, Northeastern University
Authors: Buus, S. (Ekstern), Florentine, M. (Ekstern), Poulsen, T. (Intern)
Pages: 270-270
Publication date: 1997

Host publication information
Title of host publication: American Speech and Hearing Association Convention Program
Place of publication: Boston, MA
Publisher: American Speech and Hearing Association
Main Research Area: Technical/natural sciences
Conference: Annual American Speech and Hearing Association Convention, Boston, MA, 01/01/1997
Source: orbit
Source-ID: 167897
Publication: Research › Article in proceedings – Annual report year: 1997

Low-frequency footfall noise in multi-storey timber frame buildings

General information
State: Published
Organisations: Department of Acoustic Technology, Norwegian Building Research Institute, National Board of Housing, Building and Planning
Authors: Hveem, S. (Ekstern), Homb, A. (Ekstern), Hagberg, K. (Ekstern), Rindel, J. H. (Intern)
Number of pages: 76
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 169119
Publication: Research - peer-review › Report – Annual report year: 1997
Measurement of acoustic attenuation in workrooms: Nordtest Project 1274-96

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Number of pages: 88
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 168418
Publication: Research - peer-review › Report – Annual report year: 1997

Measurements of newly defined intensimetric quantities and their physical interpretation

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Stanzial, D. (Ekstern), Prodi, N. (Intern)
Pages: 2033-2039
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Volume: 102
Issue number: 4
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.754 SNIP 1.528
Nonlinear Modelling of Low Frequency Loudspeakers: A Practical Implementation

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Olsen, E. S. (Intern)
Pages: 414-414
Publication date: 1997
Conference: 102nd Audio Engineering Society Convention, Munich, Germany, 22/03/1997 - 22/03/1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of The Audio Engineering Society
Volume: 45
Issue number: 5
ISSN (Print): 1549-4950
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.95 SJR 0.376 SNIP 0.963
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.512 SNIP 1.346 CiteScore 1.11
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Nonlinear Modelling of Low Frequency Loudspeakers: A Practical Implementation

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Olsen, E. S. (Intern)
Number of pages: 15
Publication date: 1997

Observations on the systematic deviations between two methods of measuring sound transmission loss

General information
State: Published
Organisations: Department of Acoustic Technology, Beijing Municipal Institute of Labour Protection
Authors: Jacobsen, F. (Intern), Ding, H. (Ekstern)
Pages: 1-11
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Building Acoustics
Volume: 3
Issue number: 1
Original language: English
Source: orbit
Source-ID: 167811
Publication: Research - peer-review › Journal article – Annual report year: 1997

Occlusion effects, Part I

General information
State: Published
Organisations: Department of Acoustic Technology, Department of Electrical Engineering, Hearing Systems, Oticon A/S
Authors: Hansen, M. Ø. (Intern), Poulsen, T. (Intern), Lundh, P. (Ekstern)
Number of pages: 162
Publication date: 1997

Publication information
Place of publication: Lyngby, Denmark
Publisher: Department of Acoustic Technology, Technical University of Denmark
Volume: Report 71
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
Corrections to Occlusion effects Part I
Source: orbit
Source-ID: 176204
Publication: Research › Ph.D. thesis – Annual report year: 1997

ODEON Room Acoustics Program - User Manual: Industrial, Auditorium and Combined Editions

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Christensen, C. L. (Intern)
Number of pages: 46
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167731
Publication: Research - peer-review › Report – Annual report year: 1997

Outdoor sound propagation: Computer simulation and scale model experiments

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 4
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167960
Publication: Research - peer-review › Book – Annual report year: 1997
Overview of research and educational matters in Denmark

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Number of pages: 4
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167931
Publication: Research - peer-review › Report – Annual report year: 1997

Plan for room acoustic modelling with ODEON 3.0

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Number of pages: 5
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 168419
Publication: Research - peer-review › Book – Annual report year: 1997

Reciprocity calibration of MR 103 microphones

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. (Intern)
Number of pages: 16
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167953
Publication: Research - peer-review › Report – Annual report year: 1997

Scale-model experiments related to outdoor sound propagation

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 3
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167959
Sensitivity to plant modelling uncertainties in optimal feedback control of sound radiation from a panel

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Mørkholt, J. (Intern)
Pages: 893-904
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the 1997 International Symposium on Active Control of Sound and Vibration
Place of publication: Budapest
Publisher: Scientific Society for Optics, Acoustics, Motion Pictures and Theater Technology, Publishing Company of Technical University of Budapest
Main Research Area: Technical/natural sciences
Conference: Active 97, Budapest, Hungary, 21/08/1997 - 21/08/1997
Source: orbit
Source-ID: 167828
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

Sensors and actuators for structural power measurement and control

General information
State: Published
Organisations: Department of Acoustic Technology, Centre Technique des Industries Mécaniques, University of Southampton
Authors: Elliott, S. (Ekstern), Gardonio, P. (Ekstern), David, A. (Ekstern), Pinnington, R. (Ekstern), Garcia-Bonito, J. (Ekstern), Henriksen, E. (Intern), Ohlrich, M. (Intern), Pavic, G. (Ekstern)
Number of pages: 42
Publication date: 1997

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167753
Publication: Research - peer-review › Report – Annual report year: 1997

Simultaneous measurements of temporal integration for loudness and loudness discrimination with a roving-level procedure

General information
State: Published
Organisations: Department of Acoustic Technology, Northeastern University
Authors: Buus, S. (Ekstern), Florrentine, M. (Ekstern), Poulsen, T. (Intern)
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the 20th Mid-Winter Meeting of the Association of Research in Otolaryngology
Place of publication: St. Petersburg Beach, FL
Publisher: Association of Research in Otolaryngology
Main Research Area: Technical/natural sciences
Conference: Twentieth Mid-Winter Meeting of the Association of Research in Otolaryngology, St. Petersburg Beach, FL, 01/01/1997
Source: orbit
Source-ID: 167901
Publication: Research › Article in proceedings – Annual report year: 1997

Sound classification of dwellings in the Nordic countries

General information
State: Published
Organisations: Department of Acoustic Technology, Norwegian Council for Building Standardization
Authors: Rindel, J. H. (Intern), Turunen-Rise, I. (Ekstern)
Pages: 127-132
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the 1997 Autumn Conference
Place of publication: At Albans
Publisher: Institute of Acoustics
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167962
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

Sound Intensity

General information
State: Published
Organisations: Department of Acoustic Technology, Auburn University
Authors: Crocker, M. (Ekstern), Jacobsen, F. (Intern)
Pages: 1855-1868
Publication date: 1997

Host publication information
Title of host publication: Encyclopedia of Acoustics
Place of publication: New York, NY
Publisher: John Wiley & Sons
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167816
Publication: Research - peer-review › Book chapter – Annual report year: 1997

Sound intensity and its measurement

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jacobsen, F. (Intern)
Pages: 2231-2246
Publication date: 1997

Host publication information
Title of host publication: Proceedings of Fifth International Congress on Sound and Vibration
Place of publication: Auburn, AL
Publisher: The International Institute of Acoustics and Vibration (IIAV)
Main Research Area: Technical/natural sciences
Conference: 5th International Congress on Sound and Vibration, Adelaide, Australia, 15/12/1997 - 15/12/1997
Source: orbit
Source-ID: 167817
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

Støjens synlig: Ny standard skal sætte tal på lydniveauet i boliger og inddele boliger i fire klasser

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern)
Pages: 24-24
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Temporal integration of loudness in listeners with normal hearing and sensorineural hearing loss

General information
State: Published
Organisations: Department of Acoustic Technology, Northeastern University
Authors: Buus, S. (Ekstern), Florentine, M. (Ekstern), Poulsen, T. (Intern)
Pages: 42-42
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the Second Biennial Hearing Aid Research and Development Conference
Place of publication: Bethesda, MD
Publisher: National Institute of Deafness and Other Communication Disorders and Veterans Administration
Main Research Area: Technical/natural sciences
Conference: Second Biennial Hearing Aid Research and Development Conference, Bethesda, MD, 01/01/1997
Source-ID: 167900
Publication: Research › Article in proceedings – Annual report year: 1997

Temporal integration of loudness, loudness discrimination, and the form of the loudness function
Temporal integration for loudness of 5-kHz tones was measured as a function of level between 2 and 60 dB SL. Absolute thresholds and levels required to produce equal loudness were measured for 2-, 10-, 50- and 250-ms tones using adaptive, two interval, two alternative forced choice procedures. The procedure for loudness balances is new and obtained concurrent measurements for ten tone pairs in ten interleaved tracks. Each track converged at the level required to make the variable stimulus just louder than the fixed stimulus. Thus, the data yield estimates of the just noticeable difference for loudness level and temporal integration for loudness. Results for four listeners show that the amount of temporal integration, defined as the level difference between equally loud short and long tones, varies markedly with level and is largest at moderate levels. The effect of level increases as the duration of the short stimulus decreases and is largest for comparisons between the 2- and the 250-ms tones. The loudness-level jnds are also largest at moderate levels and, contrary to traditional jnds for the level of two dual-duration tones, they do not appear to depend on duration. The latter finding indicates that loudness discrimination between stimuli that differ along multiple dimensions is not the same as level discrimination between stimuli that differ only in level. An equal-loudness-ratio model, which assumes that the ratio of loudnesses for a long and a short tone at equal SPL is the same at all SPLs, can explain the level dependence of temporal integration and the loudness jnds. It indicates that the loudness function (log(loudness) versus SPL) is flatter at moderate levels than at low and high levels in agreement with earlier findings for 1-kHz tones [M. Florentine et al., J. Acoust. Soc. Am. 99, 1633-1644 (1996)].

General information
State: Published
Organisations: Department of Acoustic Technology, Northeastern University
Authors: Buus, S. (Ekstern), Florentine, M. (Ekstern), Poulsen, T. (Intern)
Pages: 669-680
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Volume: 101
Issue number: 2
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
The Control of Transmitted Power in an Active Isolation System

General information
State: Published
Organisations: Department of Acoustic Technology, University of Southampton, Centre Technique des Industries Mécaniques
Authors: Elliott, S. (Ekstern), Gardonio, P. (Ekstern), Pinnington, R. (Ekstern), David, A. (Ekstern), Garcia-Bonito, J. (Ekstern), Pavic, G. (Ekstern), Besombes, M. (Ekstern), Ohrlich, M. (Intern), Laugesen, S. (Intern), Henriksen, E. (Intern)
Pages: 93-104
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the 1997 International Symposium on Active Control of Sound and Vibration
Place of publication: Budapest
Publisher: Scientific Society of Optics, Acoustics, Motion Pictures and Theater Technology, Publishing Company of Technical University of Budapest
Main Research Area: Technical/natural sciences
Conference: Active 97, Budapest, Hungary, 21/08/1997 - 21/08/1997
Source: orbit
Source-ID: 167834
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

The influence of basic design variables on the acoustics of concert halls; new results derived from analysing a large number of existing halls

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Gade, A. C. (Intern)
Pages: 95-102
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the Institute of Acoustics
Place of publication: St Albans
Publisher: Institute of Acoustics
Main Research Area: Technical/natural sciences
Conference: Institute of Acoustics Meeting, Belfast, 01/01/1997
Source: orbit
Source-ID: 167734
Publication: Research - peer-review › Article in proceedings – Annual report year: 1997

The insertion loss of screens under the influence of wind

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern), Arranz, M. G. (Intern)
Pages: 313-318
Publication date: 1997

Host publication information
Title of host publication: Proceedings of the 1997 International Congress on Noise Control Engineering
Place of publication: Budapest
Undersøgelse af fundamentale ulineariteter i elektrodynamiske højttalere: Rapport over LoDist projektet

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Olsen, E. S. (Intern)
Number of pages: 102
Publication date: 1997

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 167957
Publication: Research - peer-review › Report – Annual report year: 1997

A boundary element model for lined circular ducts with uniform flow

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Juhl, P. M. (Intern)
Pages: 881-888
Publication date: 1996

Host publication information
Title of host publication: Fourth International Congress on sound and vibration - Proceedings
Place of publication: Auburn, AL
Publisher: International Scientific Publications
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 166500
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

Accuracy limitations of current accelerometers and implications on power measurements in active control

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Henriksen, E. (Intern), Ohlrich, M. (Intern)
Number of pages: 13
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165877
Publication: Research - peer-review › Report – Annual report year: 1996

Acoustic Finite Element Calculations in the Time Domain

General information
State: Published
A critical examination of some of the field indicators that have been proposed in connection with sound power determination using the intensity method

Active control of multi-modal propagation of tonal noise in chimneys

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Laugesen, S. (Intern)
Pages: 33-56
Publication date: 1996
Main Research Area: Technical/natural sciences
Publication information
Journal: Journal of Sound and Vibration
Volume: 195
Issue number: 1
ISSN (Print): 0022-460X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
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<th>Year</th>
<th>BFI Level</th>
<th>Scopus Rating (SJR, SNIP, CiteScore)</th>
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<td>2017</td>
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<td>SJR 1.391 SNIP 2.698 CiteScore 2.05</td>
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<td>SJR 1.495 SNIP 2.992 CiteScore 2.3</td>
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<td>2011</td>
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<td>SJR 1.384 SNIP 2.185</td>
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<td>SJR 1.218 SNIP 2.069</td>
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<td>Level 2</td>
<td>SJR 1.173 SNIP 1.701</td>
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<td>2007</td>
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<td>SJR 1.087 SNIP 1.624</td>
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<td>2006</td>
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<td>SJR 0.936 SNIP 1.463</td>
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<td>2005</td>
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<td>SJR 0.928 SNIP 1.385</td>
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<td>2004</td>
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<td>SJR 1.243 SNIP 1.385</td>
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<td>2003</td>
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<td>SJR 1.386 SNIP 1.27</td>
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<td>2002</td>
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<td>SJR 0.836 SNIP 1.322</td>
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<td>2001</td>
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<td>2000</td>
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<td>SJR 0.992 SNIP 1.152</td>
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Original language: English
Source: orbit
Source-ID: 165596
Publication: Research - peer-review › Journal article – Annual report year: 1996
Active control of radiated sound power from a baffled, rectangular panel

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Mørkholt, J. (Intern)
Pages: 1211-1214
Publication date: 1996

Host publication information
Title of host publication: Inter-Noise 96 - Proceedings
Place of publication: St Albans
Publisher: The Institute of Acoustics
Main Research Area: Technical/natural sciences
Conference: The 1996 International Congress on Noise Control Engineering, Liverpool, 01/01/1996
Source: orbit
Source-ID: 166296
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

Adaptive active control of structural vibration by minimisation of total supplied power

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Henriksen, E. (Intern)
Pages: 1615-1618
Publication date: 1996

Host publication information
Title of host publication: Inter-Noise 96 - Proceedings
Place of publication: St Albans
Publisher: Institute of Acoustics
Main Research Area: Technical/natural sciences
Conference: The 1996 International Congress on Noise Control Engineering, Liverpool, 01/01/1996
Source: orbit
Source-ID: 165834
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

Adaptive algorithm for minimisation of power: Further notes on time domain simulations

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Laugesen, S. (Intern), Henriksen, E. (Intern), Ohlrich, M. (Intern)
Number of pages: 9
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165871
Publication: Research - peer-review › Report – Annual report year: 1996

A note on phase calibration of transducer set for power measurements

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern), Henriksen, E. (Intern), Laugesen, S. (Intern)
Number of pages: 6
Publication date: 1996
A numerical investigation of the performance of sound intensity probes at high frequencies

General information
State: Published
Organisations: Department of Acoustic Technology, Technical University of Denmark
Authors: Cutanda, V. (Ekstern), Juhl, P. M. (Intern), Jacobsen, F. (Intern)
Pages: 1897-1904
Publication date: 1996

Host publication information
Title of host publication: Fourth International Congress on Sound and Vibration
Place of publication: Auburn, AL
Publisher: International Scientific Publications
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 166508
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

Application of the power minimising method on an aluminium beam

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Henriksen, E. (Intern), Ohlrich, M. (Intern)
Number of pages: 4
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165874
Publication: Research - peer-review › Report – Annual report year: 1996

Applications of a system for two-channel auralization using ODEON-SOUND

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern), Christensen, C. L. (Intern)
Pages: 2579-2579
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Volume: 100
Issue number: 4
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
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Original language: English

Electronic versions:
Rindel.pdf
DOIs:
10.1121/1.417515

Bibliographical note
Applications of a system for two-channel auralization using ODEON-SOUND.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern), Christensen, C. L. (Intern)
Publication date: 1996

Host publication information
Title of host publication: Third Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan
Main Research Area: Technical/natural sciences
Conference: Third Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan, Honolulu, 01/01/1996
Source: orbit
Source-ID: 185527
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

Approximations in the PE-method: Phase and level errors in a downward refracting atmosphere

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Arranz, M. G. (Intern)
Pages: 235-255
Publication date: 1996

Host publication information
Title of host publication: Seventh International Symposium on Long Range Sound Propagation
Place of publication: Ecully
Publisher: Laboratoire de Mécanique des Fluides et d'Acoustique, Ecole Centrale de Lyon
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165358
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

A sound intensity probe for measuring from 50 Hz to 10 kHz

General information
State: Published
Organisations: Department of Acoustic Technology, Polytechnical University of Madrid
Authors: Jacobsen, F. (Intern), Cutanda, V. (Ekstern), Juhl, P. M. (Intern)
Pages: 3357-3362
Publication date: 1996

Host publication information
Volume: Books 1-6
Place of publication: St. Albans
Publisher: Institute of Acoustics
ISBN (Print): 1-873082-91-6
Main Research Area: Technical/natural sciences
Conference: International Congress on Noise Control Engineering, Liverpool, United Kingdom, 30/07/1996 - 30/07/1996
Source: orbit
Source-ID: 164898
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996
A sound intensity probe for measuring from 50 Hz to 10 kHz

General information
State: Published
Organisations: Department of Acoustic Technology, Polytechnical University of Madrid
Authors: Jacobsen, F. (Intern), Cutanda, V. (Ekstern), Juhl, P. M. (Intern)
Pages: 1-8
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: Brüel & Kjær Technical Review
Issue number: 1
Original language: English
Source: orbit
Source-ID: 164902
Publication: Research › Journal article – Annual report year: 1996

A study of online plant modelling methods for active control of sound and vibration

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Laugesen, S. (Intern)
Pages: 1109-1114
Publication date: 1996

Host publication information
Title of host publication: Inter-Noise 96 - Proceedings
Place of publication: St Albans
Publisher: Institute of Acoustics
Main Research Area: Technical/natural sciences
Conference: The 1996 International Congress on Noise Control Engineering, Liverpool, 01/01/1996
Source: orbit
Source-ID: 165752
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

A Time-Frequency Auditory Model Using Wavelet Packets

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Agerkvist, F. (Intern)
Pages: 37-50
Publication date: 1996
Conference: 97th Convention of the Audio Engineering Society, San Francisco, 01/01/1994
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of The Audio Engineering Society
Volume: 44
Issue number: 1/2
ISSN (Print): 1549-4950
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.95 SJR 0.376 SNIP 0.963
Web of Science (2016): Indexed yes
Audibility of individual reflections in a complete sound field, III

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Bech, S. (Intern)
Pages: 2803-2803
Publication date: 1996
Conference: Third Joint Meeting of the Acoustical Societies of America and Japan, Honolulu, 01/01/1996
Main Research Area: Technical/natural sciences

Publication information
Volume: 100
Issue number: 4, Pt. 2
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
Bias errors in measurements of vibratory power

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern), Henrikson, E. (Intern)
Number of pages: 8
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165878
Publication: Research - peer-review › Report – Annual report year: 1996

Building Codes: Comparison between countries and future requirements

General information
State: Published
Organisations: Department of Acoustic Technology, Velux A/S
Authors: Rindel, J. H. (Intern), Rasmussen, B. (Ekstern)
Pages: 99-99
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: Acustica
Volume: 82
Issue number: Suppl. 1
ISSN (Print): 0001-7884
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2004): SJR 0.585 SNIP 2.135
Scopus rating (2003): SJR 0.464 SNIP 1.995
Scopus rating (2002): SJR 0.358 SNIP 1.307
Scopus rating (2001): SJR 0.279 SNIP 0.533
Scopus rating (2000): SJR 0.418 SNIP 0.761
Scopus rating (1999): SJR 0.514 SNIP 1.017
Original language: English
Source: orbit
Source-ID: 166122
Publication: Research › Journal article – Annual report year: 1996

Diffraction and diffusion in room acoustics

General information
State: Published
Organisations: Department of Acoustic Technology, Velux A/S
Authors: Rindel, J. H. (Intern), Rasmussen, B. (Ekstern)
Pages: 58-63
Publication date: 1996

Host publication information
Title of host publication: 33rd Conference on Acoustics, Building and Room Acoustics, Proceedings
Place of publication: Prague
Publisher: Czech Acoustical Society
Main Research Area: Technical/natural sciences
Conference: 33rd Conference on Acoustics, Prague, 01/01/1996
Source: orbit
Energy distribution of structure-borne sound in three-dimensional structures

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Hugin, C. T. (Intern)
Number of pages: 57
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165881
Publication: Research › Report – Annual report year: 1996

Evaluation of Noise in Hearing Instruments Caused by GSM and DECT Mobile Telephones

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Hansen, M. Ø. (Intern), Poulsen, T. (Intern)
Pages: 227-232
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: Scandinavian Audiology
Volume: 25
Issue number: 4
ISSN (Print): 0105-0397
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2004): SJR 0.703 SNIP 2.403
Scopus rating (2003): SJR 0.307 SNIP 1.075
Scopus rating (2002): SJR 0.312 SNIP 1.506
Scopus rating (2001): SJR 0.571 SNIP 0.849
Scopus rating (2000): SJR 0.388 SNIP 0.754
Scopus rating (1999): SJR 0.587 SNIP 1.075
Original language: English
Source: orbit
Source-ID: 165957
Publication: Research › Journal article – Annual report year: 1996

Exercise related to digital audio

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 4
Publication date: 1996

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165618
Publication: Research › Book – Annual report year: 1996
Exercise related to tape recorders

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 5
Publication date: 1996

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165619
Publication: Research - peer-review › Book – Annual report year: 1996

Experiment with a real time power minimising active control system

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Henriksen, E. (Intern), Laugesen, S. (Intern), Ohrich, M. (Intern)
Number of pages: 11
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165872
Publication: Research - peer-review › Report – Annual report year: 1996

Extended version of a real time structural vibration active control system: Hardware requirements and software installation notes

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Henriksen, E. (Intern), Ohrich, M. (Intern)
Number of pages: 14
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165876
Publication: Research - peer-review › Report – Annual report year: 1996

Final assessment of vibro-acoustic source strength descriptors of helicopter gearboxes

General information
State: Published
Organisations: Department of Acoustic Technology, Ødegaard & Danneskiold-Samsøe A/S
Authors: Ohrich, M. (Intern), Rasmussen, U. M. (Ekstern)
Number of pages: 21
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Final report on development of adaptive control algorithm for active control of total power input

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Laugesen, S. (Intern), Henriksen, E. (Intern), Ohlrich, M. (Intern)
Number of pages: 57
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165865
Publication: Research - peer-review › Report – Annual report year: 1996

Final technical report on development of adaptive control algorithm for active control of total power input

General information
State: Published
Organisations: Acoustic Technology, Department of Electrical Engineering, Department of Acoustic Technology
Authors: Ohlrich, M. (Intern), Henriksen, E. (Ekstern), Laugesen, S. (Ekstern)
Number of pages: 14
Publication date: 1996

Publication information
Place of publication: Kgs. Lyngby, Denmark
Publisher: Department of Acoustic Technology, Technical University of Denmark
Original language: English
Series: ASPEN Reports no: AS5DTU 21 and -22
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 239711
Publication: Research - peer-review › Report – Annual report year: 1996

Final technical report on the method of source strength descriptors

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Ohlrich, M. (Intern)
Number of pages: 9
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165869
Publication: Research - peer-review › Report – Annual report year: 1996

Ground Attenuation of Railroad Noise

General information
State: Published
Organisations: Department of Acoustic Technology, Kyushu Institute of Design, Adam Mickiewicz University
Authors: Makarewicz, R. (Ekstern), Rasmussen, K. B. (Intern), Kokowski, P. (Ekstern)
Pages: 636-641
Publication date: 1996
Guide to exercise in Acoustic Communications

General information
State: Published
Organisations: Department of Acoustic Technology, Technical University of Denmark
Authors: Han, L. A. (Ekstern), Poulsen, T. (Intern)
Publication date: 1996

Guide to Measurements on Hearing for grammar school pupils

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Publication date: 1996

High convergence order finite elements with lumped mass matrix

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Jensen, M. S. (Intern)
Pages: 1879-1888
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Volume: 39
ISSN (Print): 0029-5981
How to take absorptive surfaces into account when designing outdoor sound reinforcement systems

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 12
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165541
Publication: Research - peer-review › Report – Annual report year: 1996

Investigations into the attenuation by screens under the influence of wind

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Pages: 127-127
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: Acustica
Volume: 82
Issue number: Suppl. 1
ISSN (Print): 0001-7884
Ratings:
BFI (2008): BFI-level 1
Scopus rating (2004): SJR 0.585 SNIP 2.135
Scopus rating (2003): SJR 0.464 SNIP 1.995
Scopus rating (2002): SJR 0.358 SNIP 1.307
Scopus rating (2001): SJR 0.279 SNIP 0.533
Scopus rating (2000): SJR 0.418 SNIP 0.761
Scopus rating (1999): SJR 0.514 SNIP 1.017
Original language: English
Source: orbit
Source-ID: 165597
Publication: Research › Journal article – Annual report year: 1996
Loudspeakers and their radiation

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern)
Number of pages: 34
Publication date: 1996

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165615
Publication: Research - peer-review › Book – Annual report year: 1996

Loudspeaker systems in rooms

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Gade, A. C. (Intern)
Number of pages: 79
Publication date: 1996

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 166344
Publication: Research - peer-review › Book – Annual report year: 1996

Lydfelter

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. (Intern)
Number of pages: 165
Publication date: 1996

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165094
Publication: Research - peer-review › Book – Annual report year: 1996

Measurements on Hearing

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Publication date: 1996

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165965
Publication: Research - peer-review › Book – Annual report year: 1996
Nonlinear Modelling of Low Frequency Loudspeakers: A More Complete Model

General information
State: Published
Organisations: Department of Acoustic Technology, Bang & Olufsen A/S
Authors: Olsen, E. S. (Intern), Christensen, K. B. (Ekstern)
Number of pages: 15
Publication date: 1996

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 165493
Publication: Research - peer-review › Report – Annual report year: 1996

Observations on the systematic deviations between the results of the conventional method and the sound intensity method of measuring transmission loss

General information
State: Published
Organisations: Department of Acoustic Technology, Beijing Municipal Institute of Labour Protection
Authors: Jacobsen, F. (Intern), Ding, H. (Ekstern)
Pages: 2719-2724
Publication date: 1996

Host publication information
Title of host publication: Inter-Noise 96, Noise Control - The Next 25 Years
Place of publication: St Albans
Publisher: Institute of Acoustics
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 164900
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

OMNIDIRECTIONAL SOUND SOURCE
A sound source comprising a loudspeaker (6) and a hollow coupler (4) with an open inlet which communicates with and is closed by the loudspeaker (6) and an open outlet, said coupler (4) comprising rigid walls which cannot respond to the sound pressures produced by the loudspeaker (6). According to the invention the loudspeaker (6) comprises a cabinet (8) being narrowed down in the rearward direction. In this manner it is avoided that the cabinet (8) gives a shade from the radiation in the rearward direction, whereby a substantially omnidirectional characteristics is obtained within a relatively large frequency range.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Polack, J. (Intern)
Publication date: 1996

Publication information
Patent number: WO1996011558
Date: 18/04/1996
Original language: Danish

Bibliographical note
Licensed to Brüel & Kjær A/S in Sept. 1994
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174490
Publication: Research › Patent – Annual report year: 1996
Room acoustic enhancement in a small hall with very low natural reverberation time

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Gade, A. C. (Intern)
Pages: 516-516
Publication date: 1996

Host publication information
Title of host publication: NAM 96 - Proceedings
Place of publication: Helsinki
Publisher: The Acoustical Society of Finland
Main Research Area: Technical/natural sciences
Conference: Nordic Acoustical Meeting, Helsinki, Finland, 12/06/1996 - 12/06/1996
Source: orbit
Source-ID: 166256
Publication: Research › Article in proceedings – Annual report year: 1996

Room acoustic properties of concert halls: Quantifying the influence of size, shape, and absorption area
A large database of values of various room acoustic parameters has provided the basis for statistical analyses of how and how much the acoustic properties of concert halls are influenced by their size, shape, and absorption area (as deduced from measured reverberation time). The data have been collected over a 15-year period from about fifty concert halls in Europe and the U.S.A. In all halls the same measurement technique was used (1/1 octave sweep tones all bandpass filtered to form impulse responses per octave band). Because of the large range of geometric differences contained in the material, it has been possible to derive empirical regression formulas from which the influence of certain geometrical design variables can be quantified. The author has found these fairly simple relationships useful in teaching and as guidelines both in the early stages of physical hall design and in setting up electronic reverberation enhancement systems.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Gade, A. C. (Intern)
Pages: 2802-2802
Publication date: 1996
Conference: Third Joint Meeting of the Acoustical Societies of America and Japan, Honolulu, 01/01/1996
Main Research Area: Technical/natural sciences

Publication information
Volume: 100
Issue number: 4, Pt. 2
ISSN (Print): 0001-4966
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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Scale model investigations into the insertion loss of screens under the influence of wind

A hard screen on an absorbing ground is investigated experimentally under the influence of wind. The experimental data are the result of model experiments in a 1:25 scale model within a wind tunnel. The sound propagation is measured using a triggered spark source and averaging on a power basis in the frequency domain. The meteorological data representing the wind conditions have been determined by means of hot-wire anemometry in positions on both sides of the screen as well as directly over the screen. The measured data are compared with calculated results from PE calculations and from an alternative ray oriented approach based upon the use of diffraction theory for the screen.
Scattering as a key to improved room acoustic computer modelling

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rindel, J. H. (Intern), Christensen, C. L. (Intern)
Pages: 517-517
Publication date: 1996

Host publication information
Title of host publication: NAM 96 - Proceedings
Place of publication: Helsinki
Publisher: The Acoustical Society of Finland
Main Research Area: Technical/natural sciences
Conference: Nordic Acoustical Meeting, Helsinki, Finland, 12/06/1996 - 12/06/1996
Source: orbit
Source-ID: 166118
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

Simultaneous measurements of room acoustic parameters using different measuring equipment

General information
State: Published
Organisations: Department of Acoustic Technology, Statsbygg Oslo, Norasonic
Authors: Halmrast, T. (Ekstern), Gade, A. C. (Intern), Winsvold, B. (Ekstern)
Pages: 209-212
Publication date: 1996

Host publication information
Title of host publication: NAM 96 - Proceedings
Place of publication: Helsinki
Publisher: The Acoustical Society of Finland
Main Research Area: Technical/natural sciences
Conference: Nordic Acoustical Meeting, Helsinki, Finland, 12/06/1996 - 12/06/1996
Source: orbit
Source-ID: 166341
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996
Some consequences of including low frequencies in the evaluation of floor impact sound

General information
State: Published
Organisations: Department of Acoustic Technology, Velux A/S
Authors: Rindel, J. H. (Intern), Rasmussen, B. (Ekstern)
Pages: 2769-2769
Publication date: 1996
Conference: Third Joint Meeting of the Acoustical Societies of America and Japan, Honolulu, 01/01/1996
Main Research Area: Technical/natural sciences

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Volume: 100
Issue number: 4, Pt. 2
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Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.754 SNIP 1.528
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.783 SNIP 1.717
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.848 SNIP 1.633
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.865 SNIP 1.647
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.752 SNIP 1.559
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.954 SNIP 1.749
Sound propagation over screened ground under upwind conditions

A screen on an absorbing ground is investigated experimentally and theoretically under upwind conditions. The experimental data are the result of scale model experiments in a 1:25 scale model. The sound propagation is measured using a triggered spark source with signal spectrum averaging in the frequency domain. The meteorological data representing the wind conditions have been determined by means of hot-wire anemometry in positions on both sides of the screen as well as directly over the screen. The theoretical model used for comparison is a hybrid approach. The sound field without a barrier is determined by means of numerical integration of a Hankel transform solution for a stratified atmosphere [like a fast field program (FFP) but taking the near field into account]. This solution is used on both sides of the screen and is combined with a screen diffraction calculation. Results from the calculation model are able to explain the overall tendency in the experimental results.
Static pressure and temperature coefficients of laboratory standard microphones

The sensitivity of condenser measurement microphones depends on the environmental conditions due to the changes in the acoustic properties of the enclosed air between diaphragm and back-electrode and in the cavity behind the backelectrode. A theoretical investigation has been performed based on an extended lumped parameter representation of the mechanical and acoustical elements of the microphone, assuming the velocity distribution of the diaphragm to follow the zero-order Bessel function. The extension involves the frequency dependency of the dynamic diaphragm mass and stiffness as well as a first-order approximation of resonances in the back cavity. It was found that each of the coefficients, for a given type of microphone, can be expressed by a single function when the coefficients are normalized by their low-frequency value and the frequency axis normalized by the individual resonance frequency of the microphone. The static pressure and temperature coefficients were determined experimentally for about twenty samples of type BK 4160 and BK 4180 microphones. The results agree almost perfectly with the predictions for BK 4160, while some modifications of the lumped parameter values are called for to make the results for BK 4180 fit the predicted values.
Temporal coherence of a soundfield in the turbulent atmosphere near the ground

General information
State: Published
Organisations: Department of Acoustic Technology, National Research Council of Italy
Authors: Arranz, M. G. (Intern), Havelock, D. I. (Ekstern)
Pages: 149-159
Publication date: 1996

Host publication information
Title of host publication: Seventh International Symposium on Long Range Sound Propagation
Place of publication: Ecully
Temporal integration of loudness as a function of level

Absolute thresholds were measured for 5-, 30-, and 200-ms stimuli using an adaptive, forced choice procedure. Temporal integration of loudness for these durations was also measured for a 1-kHz tone and for broadband noises over a range of 5-80 dB SL (noise) and 5-90 dB SL (tones). Results show that temporal integration (defined as the level difference between equally loud 5- and 200-ms stimuli) varies non-monotonically with level. The temporal integration is about 10-12 dB near threshold, increases to 18-19 dB when the 5-ms signal is about 56 dB SPL (tone) and 76 dB SPL (noise), decreases again around 100 dB SPL to about 10 dB (tones) and 13 dB (noise). The data for tones are in good agreement with the majority of existing data. The data for noises are within the range of the few previous data, but the effect of level differs from that obtained in previous studies. The present results indicate that the growth of loudness may, at least in part, be consistent with the nonlinear input/output function of the basilar membrane.
The influence of low frequencies on the assessment of noise from neighbours

General information
State: Published
Organisations: Department of Acoustic Technology, Velux A/S
Authors: Rindel, J. H. (Intern), Rasmussen, B. (Ekstern), Nielsen, J. R. (Intern)
Pages: 518-518
Publication date: 1996

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Title of host publication: NAM 96 - Proceedings
Place of publication: Helsinki
Publisher: The Acoustical Society of Finland
Main Research Area: Technical/natural sciences
Conference: Nordic Acoustical Meeting, Helsinki, Finland, 12/06/1996 - 12/06/1996
Source: orbit
Source-ID: 166119
Publication: Research - peer-review › Article in proceedings – Annual report year: 1996

The parabolic equation method for outdoor sound propagation
The use of surface power for characterisation of structure-borne sound sources of low modal density

Timbral aspects of reproduced sound in small rooms. II

A single loudspeaker with frequency-dependent directivity characteristics, positioned in a room of normal size with frequency-dependent absorption coefficients of the room surfaces, has been simulated using an electroacoustic setup. The model included the direct sound, seventeen individual reflections and the reverberant field. The threshold of detection, and just-noticeable differences for an increase in level were measured for individual reflections. The results have confirmed that the first-order floor reflection is likely to contribute individually to the timbre of reproduced noise. However, for a speech signal none of the investigated reflections will contribute individually to the timbre. It is suggested that the threshold of detection is determined by the spectral changes in the dominant frequency range of 500 Hz to 2 kHz. For increases in the level of individual reflections, the most likely to be audible is the first-order floor reflection, for speech and noise. For a noise signal, additional reflections from the wall to the left and behind the listener also belong to this group.
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.754 SNIP 1.528
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.783 SNIP 1.717
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.848 SNIP 1.633
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.865 SNIP 1.647
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.752 SNIP 1.559
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.954 SNIP 1.749
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.77 SNIP 1.787
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.882 SNIP 1.712
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.87 SNIP 1.501
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.719 SNIP 1.467
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.621 SNIP 1.411
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.591 SNIP 1.319
Original language: English
Electronic versions:
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DOIs:
10.1121/1.414952

Bibliographical note
Wohnungen für die Zukunft: Das Konzept des akustischen Komforts und welcher Schallschutz

General information
State: Published
Organisations: Department of Acoustic Technology, Velux A/S
Authors: Rasmussen, B. (Ekstern), Rindel, J. H. (Intern)
Pages: 4-11
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: WKSB Zeitschrift für Wärmeschutz - Kälteschutz - Schallschutz - Brandschutz
Volume: 38
Original language: English
Source: orbit
Source-ID: 166123
Publication: Research › Journal article – Annual report year: 1996

Application of the PE method to up-slope sound propagation
The wide-angle PE method is applied to the prediction of sound propagation in a range-dependent environment. The finite-difference model treats the sloping ground by a staircase approximation. The method allows impedance and slope angle variations to be taken into account. The implementation of sloping interfaces in one-way PE models introduces a fundamental problem of energy conservation. This is generated at the lower boundary condition. The ground is assumed to be a locally reacting surface where the ground impedance is defined as the ratio of pressure to the normal component of particle velocity at the surface. The staircase PE method approximates the normal at the slope surface with the vertical component at the stair-step surface. A numerical correction can be included. Using a scale model facility [K. B. Rasmussen, 3617–3620 (1994)], a series of measurements is carried out. The results are compared with the PE calculations. The magnitude of the error due to the interface condition is evaluated.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Rasmussen, K. B. (Intern), Arranz, M. G. (Intern)
Pages: 3239-3239
Publication date: 1995
Main Research Area: Technical/natural sciences

Publication information
Volume: 97
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BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Timbral aspects of reproduced sound in small rooms. I

This paper reports some of the influences of individual reflections on the timbre of reproduced sound. A single loudspeaker with frequency-independent directivity characteristics, positioned in a listening room of normal size with frequency-independent absorption coefficients of the room surfaces, has been simulated using an electroacoustic setup.
The model included the direct sound, 17 individual reflections, and the reverberant field. The threshold of detection and just-noticeable differences for an increase in level were measured for individual reflections using eight subjects for noise and speech. The results have shown that the first-order floor and ceiling reflections are likely to individually contribute to the timbre of reproduced speech. For a noise signal, additional reflections from the left sidewall will contribute individually. The level of the reverberant field has been found to have an effect on the contribution of the individual reflections. An increase in the level of individual reflections are most likely to be audible for the first-order floor and ceiling reflections, and certain reflections from the sidewalls.

**General information**

State: Published
Organisations: Department of Acoustic Technology
Authors: Bech, S. (Intern)
Pages: 1717-1726
Publication date: 1995
Main Research Area: Technical/natural sciences

**Publication information**

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BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.754 SNIP 1.528
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.783 SNIP 1.717
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.848 SNIP 1.633
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.865 SNIP 1.647
A series of scale model experiments related to outdoor propagation over an earth berm is described. The measurements are performed with a triggered spark source. The results are compared with data from an existing calculation model based upon uniform diffraction theory. Comparisons are made in the frequency domain as well as in the time domain and good agreement is obtained.
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.754 SNIP 1.528
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.783 SNIP 1.717
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.848 SNIP 1.633
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.865 SNIP 1.647
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.752 SNIP 1.559
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.954 SNIP 1.749
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.77 SNIP 1.787
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.882 SNIP 1.712
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.87 SNIP 1.501
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.719 SNIP 1.467
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.621 SNIP 1.411
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.591 SNIP 1.319
Original language: English
Electronic versions:
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Copyright (1994) Acoustical Society of America. This article may be downloaded for personal use only. Any other use requires prior permission of the author and the Acoustical Society of America.
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Source-ID: 264154
Publication: Research - peer-review › Journal article – Annual report year: 1994
The vibrational source strength descriptor using power input from equivalent forces: a simulation study

Simple, yet reliable methods for the approximate determination of the vibratory power supplied by the internal excitation forces of a given vibrational source are of great interest. One such method that relies on the application of a number of “equivalent forces” and measurements of the mean squared velocity on either the source or the receiving structure is studied in this paper by means of computer simulations. The study considers a simple system of two flexural beams coupled via a pair of springs. The investigation shows that a relatively small number of equivalent forces suffice for determining the vibratory power if applied at carefully chosen driving points, and that the velocity measurements for the method generally should be taken on the source structure. The real part of the supplied power can generally be very well estimated by the method, whereas the imaginary part is prone to somewhat larger estimation errors. The reliability of the estimate is also studied under different conditions with respect to coupling stiffness between source and receiver and relative mobility of the source and receiving structures.

General information
State: Published
Organisations: Department of Acoustic Technology, Acoustic Technology, Department of Electrical Engineering
Authors: Laugesen, S. (Intern), Ohlrich, M. (Intern)
Pages: 449-459
Publication date: 1994
Main Research Area: Technical/natural sciences

Publication information
Journal: Acta Acustica
Volume: 2
Issue number: 6
ISSN (Print): 1022-4793
Original language: English
Source-ID: 222311
Publication: Research - peer-review › Journal article – Annual report year: 1994

An investigation of the vibrational source strength descriptor by computer simulation: Source power for free and bi-coupled systems

General information
State: Published
Organisations: Department of Acoustic Technology, Acoustic Technology, Department of Electrical Engineering
Authors: Laugesen, S. (Intern), Ohlrich, M. (Intern)
Number of pages: 56
Publication date: 1993

Publication information
Place of publication: DK-2800 Kgs. Lyngby
Publisher: The Acoustics Laboratory, Technical University of Denmark
Original language: English
Series: RHINO, Contract Report
Number: 2-93
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 240633
Publication: Research › Report – Annual report year: 1993

Multichannel active control of random noise in a small reverberant room

An algorithm for multichannel adaptive IIR (infinite impulse response) filtering is presented and applied to the active control of broadband random noise in a small reverberant room. Assuming complete knowledge of the primary noise, the theoretically optimal reductions of acoustic energy are initially calculated by means of a frequency-domain model. These results are contrasted with results of a causality constrained theoretical time-domain optimization which are then compared with experimental results, the latter two results showing good agreement. The experimental performances of adaptive multichannel FIR (finite impulse response) and IIR filters are then compared for a four-secondary-source, eight-error microphone active control system, and it is found that for the present application FIR filters are sufficient when the primary noise source is a loudspeaker. Some experiments are then presented with the primary noise field generated by a panel excited by a loudspeaker in an adjoining room. These results show that far better performances are provided by IIR and FIR filters when the primary source has a lightly damped dynamic behavior which the active controller must model.

General information
Time-frequency analysis with temporal and spectral resolution as the human auditory system
The human perception of sound is a suitable area for the application of a simultaneous time-frequency analysis, since the ear is selective in both domains. A perfect reconstruction filter bank with bandwidths approximating the critical bands is presented. The orthogonality of the filter makes it possible to examine the masking effect with realistic signals. The tree structure of the filter bank makes it difficult to obtain well-attenuated stop-bands. The use of filters of different length solves this problem

Electroacoustical simulation of listening room acoustics for project ARCHIMEDES
ARCHIMEDES is a psychoacoustics research project, funded under the European EUREKA scheme. Three partners share the work involved: The Acoustics Laboratory of The Technical University of Denmark; Bang and Olufsen of
Denmark; and KEF Electronics of England. Its primary object is to quantify the influence of listening room acoustics on the timbre of reproduced sound. For simulation of the acoustics of a standard listening room, an electroacoustic setup has been built in an anechoic chamber. The setup is based on a computer model of the listening room, and it consists of a number of loudspeakers positioned on an imaginary sphere surrounding the position of the test subject. The setup has been designed for the highest degree of flexibility. This includes the possibility of simulation of directivity characteristics of normal domestic loudspeakers and absorption coefficients of the surfaces of the listening room. This paper is a presentation of the system, with special emphasis on the psychoacoustical background of the design. This will include a discussion of choice of experimental procedure, test stimuli, and test subjects as well as purpose built loudspeakers and the DSP system.

**General information**

State: Published  
Organisations: Department of Acoustic Technology  
Authors: Bech, S. (Intern)  
Pages: S2-S2  
Publication date: 1989  
Main Research Area: Technical/natural sciences

**Publication information**

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ISSN (Print): 0001-4966  
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BFI (2018): BFI-level 2  
Web of Science (2018): Indexed yes  
BFI (2017): BFI-level 2  
Web of Science (2017): Indexed yes  
BFI (2016): BFI-level 2  
Scopus rating (2016): CiteScore 1.83 SJR 0.749 SNIP 1.27  
Web of Science (2016): Indexed yes  
BFI (2015): BFI-level 2  
Scopus rating (2015): SJR 0.802 SNIP 1.437 CiteScore 1.77  
Web of Science (2015): Indexed yes  
BFI (2014): BFI-level 2  
Scopus rating (2014): SJR 0.788 SNIP 1.423 CiteScore 1.8  
Web of Science (2014): Indexed yes  
BFI (2013): BFI-level 2  
Scopus rating (2013): SJR 0.705 SNIP 1.966 CiteScore 2  
ISI indexed (2013): ISI indexed yes  
Web of Science (2013): Indexed yes  
BFI (2012): BFI-level 2  
Scopus rating (2012): SJR 0.763 SNIP 1.622 CiteScore 1.75  
ISI indexed (2012): ISI indexed yes  
Web of Science (2012): Indexed yes  
BFI (2011): BFI-level 2  
Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68  
ISI indexed (2011): ISI indexed yes  
Web of Science (2011): Indexed yes  
BFI (2010): BFI-level 2  
Scopus rating (2010): SJR 0.754 SNIP 1.528  
Web of Science (2010): Indexed yes  
BFI (2009): BFI-level 2  
Scopus rating (2009): SJR 0.783 SNIP 1.717  
Web of Science (2009): Indexed yes  
BFI (2008): BFI-level 2  
Scopus rating (2008): SJR 0.848 SNIP 1.633  
Web of Science (2008): Indexed yes
Can ensemble condition in a hall be improved and measured?
In collaboration with the Danish Broadcasting Corporation an extensive series of experiments has been carried out in The Danish Radio Concert Hall with the practical purpose of trying to improve the ensemble conditions on the platform for the resident symphony orchestra. First, a series of experiments in a 1:20 scale model indicated that among several suggested means the following would be the most effective and acceptable: (a) changing the shape of the sidewalls in the platform area in order to make them reflect sound back to the musicians more effectively; (b) lowering and redesigning of the ceiling reflectors; and (c) changing the position of the orchestra on the platform. These variables were then tested in full scale experiments in the hall including subjective evaluation by the orchestra in order to verify their effects under practical conditions. New objective parameters, which showed very high correlations with the subjective data, also made it possible to compare the improvements with conditions as recently measured in famous European Halls. Besides providing the needed results, the experiments also shed some light on how musicians change their criteria for judging acoustic quality depending on the experimental situation—a fact which had become evident from our previous research on musicians' room acoustic conditions.

General information
State: Published
Organisations: Department of Acoustic Technology
Authors: Gade, A. C. (Intern)
Pages: S20-S21
Publication date: 1988
Main Research Area: Technical/natural sciences

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Web of Science (2012): Indexed yes
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Scopus rating (2011): SJR 0.695 SNIP 1.642 CiteScore 1.68
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Web of Science (2010): Indexed yes
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Scopus rating (2008): SJR 0.848 SNIP 1.633
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Scopus rating (2007): SJR 0.865 SNIP 1.647
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.752 SNIP 1.559
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.954 SNIP 1.749
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.77 SNIP 1.787
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.882 SNIP 1.712
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.87 SNIP 1.501
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.719 SNIP 1.467
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.621 SNIP 1.411
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.591 SNIP 1.319

Original language: English
Electronic versions: Gade.pdf
Comments on "Precise model measurements versus theoretical prediction of barrier insertion loss in presence of the ground" [J. Acoust. Soc. Am. 73, 44–54 (1983)]

Some of the theoretical curves in the article by J. Nicolas et al. [J. Acoust. soc. Am. 73, 44–54 (1983)] appear to be erroneous.
Loudness of tone pulses in a free field
Investigations of temporal loudness summation of tone pulses have been performed. The investigations comprised equal loudness determinations between pairs of tone pulses with a duration ratio of 1:2, and threshold determinations of the same tone pulses. Pulse durations ranged from 5 to 640 ms. The frequencies were 500, 1000, and 4000 Hz. All pulses were shaped by means of 1/3 octave filters. For 25 normal hearing observers the investigations were performed at the observer's threshold, and at 35 and 55 dB SPL. Fitting of the experimental data to a single exponential function yields a time constant (tau) of about 200 ms near and at the threshold, whereas tau is about 100 ms at levels well above threshold. Discrepancies exist, nevertheless, between this single-time-constant model and the experimental data obtained for the pulses of shortest duration. To account for this, a model is proposed comprising a combination of two exponential functions. This yields a short time constant of 5 to 10 ms combined with the longer time constant mentioned above.

General information
State: Published
Organisations: Acoustic Technology, Department of Acoustic Technology
Authors: Poulsen, T. (Intern)
Pages: 1786-1790
Publication date: 1981
Main Research Area: Technical/natural sciences

Publication information
Loudness of complex sounds as a function of the standard stimulus and the number of components

The purpose of this study was twofold: to determine if the measured loudness level of a signal depends on the standard stimulus used and to measure loudness as a function of the number of components in a wide-band signal. The stimuli were a pure tone, tone complexes with frequency separations of 231 and 1592 Hz, and noise bands with widths of 220 and 1592 Hz. The center frequency was 1 kHz and the loudness level was approximately 65 phons. Loudness matches between all combinations of stimuli showed that the measured loudness of the sounds did not depend on the standard stimulus used and the measured loudness level of a wide-band sound increased as a function of the number of components. Individual observers were consistent in their loudness estimations; the greatest source of variability was among subjects. Additional measurements indicated that the rate at which loudness increased beyond the critical band appeared to be greater for noise bands than for two-tone complexes.
There are essentially two problems in conventional free-field reciprocity calibration of condenser microphones: 1) an extremely low signal-to-noise ratio at low frequencies, caused by the fact that the microphones are very poor radiators of sound below 500 Hz, and 2) reflections from the walls of the anechoic chamber. The purpose of this PhD study is to examine alternatives to the conventional free-field reciprocity calibration technique. Two experimental techniques for determining the frequency response between two microphones have been studied, a frequency domain method based on pure tone excitation, and the MLS method, which is a time domain method. A computer simulation study of the frequency
The response between two microphones in a free field has been carried out. The purpose of the simulation study is to examine if the direct field and later reflections from the walls can be separated using time windowing. The corresponding impulse response has been obtained using an inverse Fourier transform. The limitations resulting from the fact that the frequency response because of the poor signal-to-noise ratio is truncated at low frequencies have been studied. The computer simulations are supplemented by experiments using the two different methods mentioned above. The results of the study should improve the accuracy of the methods currently used in determining the free-field correction of condenser microphones. The results may also be applied to simultaneous free-field and diffuse-field calibration of condenser microphones.

Department of Acoustic Technology
Period: 01/11/2000 → …
Number of participants: 3
Project participant:
Barrera Figueroa, Salvador (Intern)
Rasmussen, Knud (Intern)

Project Manager, organisational:
Jacobsen, Finn (Intern)

Benefit provided by improved high frequency audibility: Possible involvement of acclimatisation and aetiology
At least one essential problem remains when hearing impaired patients are treated with amplifiers. People who have lost hearing sensitivity over several years have usually got accustomed to reduced peripheral activity at high frequencies. They have forgotten how to interpret high frequency input, so when they are fitted with a hearing instrument, there is a significant risk that the perceived benefit is limited. The new hearing aid user may simply not be capable of taking advantage of the newly re-audible sounds. The problem is that other factors than audibility govern perception. The precondition for audibility is obvious, but it is not a sufficient condition for speech perception. In a number of recent studies on the benefit provided by improved high frequency audibility upper frequency limits for the improvement of word recognition were found, and the authors concluded that audibility does not automatically provide intelligibility. One of the main objections that may be made towards this conclusion involves the potential need for acclimatisation to the re-audible sounds that may well be caused by central reorganisation. How to quantify such supra-threshold hearing deficit is one of the subjects for this project. Another one is to investigate the course of acclimatisation to peripheral amplification in subjects with high frequency hearing losses. The results of the project should increase our understanding of the underlying mechanisms of getting used to new auditory information.

Department of Acoustic Technology
Period: 01/09/2000 → …
Number of participants: 2
Project participant:
Vestergaard, Martin David (Intern)

Project Manager, organisational:
Poulsen, Torben (Intern)

CAHRISMA
The CAHRISMA project (Conservation of the Acoustical Heritage by the Revival and Identification of the Sinan’s Mosques’ Acoustics) is a three-year project financed by the EU. The purpose of the project is to study the acoustics of old Byzantine churches and mosques built by the ancient Turkish architect Sinan. A new measuring program was developed for the acoustic measurements in the rooms. The program uses a sweep technique previously developed and used at DTU. In short, an omnidirectional loudspeaker emits a sinusoidal sweep signal in the room, and the response of the room is simultaneously recorded with a two-channel microphone. The sweep signal is emitted and recorded through an audio card (Roland Audio Canvas UA-100) connected to a PC, using a commercial multi-track recording software (N-Track studio), and the recorded sweep is stored on the hard disk of the PC. The sweep response is then deconvolved with the inverted sweep signal, the result being the impulse response of the room. From the impulse response the different objective room acoustic parameters are calculated in the program. The average reverberation times measured in six rooms are listed in the table above. Acoustic models of three churches (Hagia Sophia, Saint Irene and Sergius & Bacchus) and three mosques (Süleymaniye, Selimiye and Sokullu) have been developed in ODEON. These rooms have a high geometrical complexity with spherical and cylindrical shapes dominating the rooms, especially large domes and numerous columns.
Wave transmission in multi-panel structures

Large engineering structures for transport, from passenger ships and super tankers to aircraft and spacecraft structures, are designed for low weight, powerful propulsion system and higher speed. Along with this tendency is a progressively more stringent requirement of higher comfort with respect to noise and smooth ride quality. Prediction of noise and vibration at the design stage is therefore becoming increasingly important. Unfortunately, there is no single prediction method that covers the entire audible frequency range, and the mid-frequency range is currently difficult to estimate. The objective of this project is to develop a technique for predicting the vibrational response of structures in this frequency range. Computational routines such as the finite element method are used successfully at low frequencies, and statistical energy analysis (SEA) in its present form is applicable at high frequencies. However, the newly proposed wave intensity analysis appears to be capable of closing the mid-frequency gap, because it allows two of the SEA assumptions to be relaxed. In the development of this technique Langley has shown that this applies to the diffuse field assumption and the equipartition of modal energies. This means that reliable predictions can be made in the mid-frequency range. In this project the wave intensity analysis has been examined, and it is found that the technique can be improved by using transmission coefficients that include the effects of finite subsystems such as damping, modal density and length-wise boundary conditions. This has been demonstrated in predictions of vibration levels in small assemblies of plate panels. The wave intensity technique in its original form has also been used for calculating the structural wave transmission and energy distribution in extended plate structures with idealised boundary conditions. Comparison with experimental results from a moderately damped box-structure of aluminium shows a good agreement.

Department of Acoustic Technology
Period: 01/02/2000 → …
Number of participants: 2

Room acoustic measurements using Brüel and Kjær equipment

The Department of Acoustic Technology cooperate with Brüel & Kjær on modifying a hand held analyser, so that it can be used for more detailed room acoustics measurements (other than reverberation time) according to the new ISO 3382 and to IEC 286-16, of which the latter specify measurement of speech intelligibility according to the RASTI method.

Department of Acoustic Technology
Brüel & Kjær A/S
Period: 01/09/1999 → …
Number of participants: 1

Adaptive equalisation of loudspeakers

The limitation of size on an electrodynamic loudspeaker’s low-frequency reproduction is an old, well-known problem. It is particularly severe in mobile telephones for hands-free speech reproduction. Many authors have described how various analogue and digital electronic techniques can extend the lower limit of a loudspeaker’s frequency range without increasing its size. One well-known technique is equalisation, in which frequencies below the loudspeaker’s lower limit are emphasised. A problem with equalisation is that the properties of a loudspeaker vary significantly due to manufacturing tolerances, temperature fluctuations, and ageing. One technique to track these changes is to perform system identification on the loudspeaker’s electrical impedance. In this project it has been found that parameters of a second-order adaptive IIR filter plant model of the electrical impedance can be used to update parameters of a digital filter performing equalisation. This was found to work for a loudspeaker in a closed-box enclosure. A fourth-order IIR plant model filter has been shown to be appropriate for identification of the parameters of a loudspeaker in a bass-reflex enclosure. In the search for efficient system identification algorithms, the behaviour of loudspeakers has been studied very closely. During a study of the single-suspension loudspeakers used in mobile phones, ‘rocking modes’ or ‘wobble behaviour’ was found to be an obstacle to using simple system identification algorithms. As a result, techniques for analysing the problem of ‘rocking modes’, along with strategies for avoiding them, were developed. The method used experimental modal analysis on data collected from a scanning laser vibrometer. A method for transforming the results of an experimental modal analysis on such data into the parameters of a rigid-body model with translation and rotational degrees of freedom is under
Design for Transmission Noise Abatement (DEMTA)
The high level of interior noise in helicopters for passenger transport is becoming an increasing problem for operators and manufacturers of helicopters. This interior noise is caused primarily by the audio-frequency vibration and noise from the main gearbox. Hence, with the objective of reducing the interior noise level significantly, the purpose of this proposed research is to develop a framework of novel theoretical prediction tools and testing guidelines for the new design and quality control of quiet gears and low vibration gearboxes. In this coordinated research the Dept. of Acoustic Technology (AT) will contribute with an advanced source strength descriptor of the gearbox, based on results from the previously reported RHINO-project, and with novel quality control techniques. At this initial stage AT is being funded by STVF's START-programme.

Objective measures for listener envelopment
The correlation between different objective measures and subjective responses regarding "envelopment" of the listener by the sound in concert halls is investigated in laboratory experiments. The work is carried out in cooperation with Lily Wang whose stay at AT is financed through an ASA Hunt post-doctoral Research Fellowship.

Range effects and re-calibration in loudness determinations
Loudness evaluations seem to be influenced by the range of stimuli presented to the subjects during a listening session. This context phenomenon is sometimes called re-calibration. A literature study has been made on this topic and a few pilot listening tests have also been performed. This work was performed during a two-month stay for Torben Poulsen at Communication Research Laboratory, Northeastern University, Boston. The investigation is related to the ongoing research on temporal integration of loudness as a function of level.

Intercomparison of calibration of artificial mastoids (EUROMET project no 401)
EUROMET project 401 comprises 6 metrology laboratories. An artificial mastoid is circulated among the laboratories for calibration. The mastoid is calibrated at the laboratory by means of the test facilities available at Brüel & Kjær. In addition a
new calibration technique is developed based upon a BK 2012 Audio Analyzer. The new technique is faster and require less instrumentation than the classical technique. The work continues.

Department of Acoustic Technology
Period: 01/01/1999 → …
Number of participants: 1
Project Manager, organisational:
Rasmussen, Knud (Intern)

Static pressure- and temperature coefficients of microphones
The sensitivity of standard microphones depends on the environmental conditions. The basic theory has been developed and described, supported by experimental results in Metrologia vol 36, 1999, pp 265-273. The original measurement on microphones type B&K 4160 and 4180 has been repeated using a faster technique and a higher frequency resolution. As a result the static pressure- and temperature coefficients for these microphones can be described by a 9'th order polynomial rather than a table. In cooperation with Brüel & Kjaer, the same technique will be used for determining these coefficients for selected types of Working Standard microphones.

Department of Acoustic Technology
Period: 01/01/1999 → …
Number of participants: 1
Project Manager, organisational:
Rasmussen, Knud (Intern)

Measurement of sound reduction using the intensity method
Since the early 1980s experimenters have compared the results of conventional diffuse-field measurements of the sound reduction of partitions with results determined using the sound intensity method. Such investigations have let to increased knowledge about the sources of errors not only of the intensity-based method but also of the much more established diffuse-field method. However, in spite of these improvements all such comparisons published so far indicate systematic deviations outside a relatively narrow frequency band from 250 Hz to 3.15 kHz. In this project the methods were compared for a variety of test walls. In all cases excellent agreement was obtained in an extended frequency range from 80 Hz to 6.3 kHz.

Department of Acoustic Technology
Period: 15/09/1998 → 01/05/1999
Number of participants: 2
Project participant:
Machimbarrena, Maria (Intern)
Project Manager, organisational:
Jacobsen, Finn (Intern)

Numerical transducer modelling
The purpose of this PhD project is to develop a complete numerical model for condenser microphones. The measurement principle of these devices is based on the electrical variations in the capacitor formed by a diaphragm exposed to the sound field and a plate inside the body of the microphone. The distance between diaphragm and backplate is of the order of 20 micrometres, giving rise to numerical and physical difficulties in the modelling. First, the very small ratio of gap width to diaphragm dimensions generates instability in the calculations. This problem has been addressed and solved. Secondly, the air trapped inside the gap presents important viscous and thermal losses that must be considered in the model, especially at high frequencies. The Navier-Stokes equations describing the phenomenon are far more complicated than the lossless wave equation. In order to build the model, these equations have been studied and adapted for numerical implementation. A model with thermal losses has been produced and found to give results in good agreement with results from the literature.

Department of Acoustic Technology
Period: 01/09/1998 → …
Number of participants: 2
Project participant:
Cutanda Henriquez, Vicente (Intern)
Project Manager, organisational:
Jacobsen, Finn (Intern)
Measurements on time varying systems with the MLS technique

The MLS technique is widely used for measurement in architectural acoustics and in audio. The MLS technique requires that the system under test is time-invariant, and it has been known for years that small changes are a source of error in such measurements, in particular if averaging is used to increase the signal-to-noise ratio. Time variance can, for example, be caused by a gradually changing temperature or motion of the air in a room. The effect of time-variance on MLS measurements has been studied through computer simulations and experiments. A new indicator analogous to the coherence function in measurements with dual channel FFT analysers has been suggested and examined experimentally in a reverberation room.

Department of Acoustic Technology
Period: 15/04/1998 → 15/04/1999
Number of participants: 3
Project participant:
Liu, Jiyuan (Intern)
Rasmussen, Karsten Bo (Intern)

Sound propagation in a lined duct with flow (DUCAT)

In the first phase of this project a boundary element formulation for modelling the sound field inside and outside a duct placed in a uniform flow was developed. The model was the first step towards the development of models for predicting the noise radiated from turbo fan engines. For this purpose the frequency range of interest is very large (up to $ka=40$), and an axisymmetric formulation has been developed in order to minimise the computational work. Non-axisymmetric excitation is important in fan noise predictions (spinning modes), and thus the model has been extended to allow for spinning modes. The model allows the duct to be partially or fully treated with an axisymmetric locally reacting liner. The model calculates the sound field inside and outside the duct simultaneously, and the results are presented in terms of a modal expansion inside the duct and a directivity pattern outside the duct. The results of the model have been compared with results from the literature and from a semi-analytical model developed by NLR. Good agreement has been found in the entire frequency range of interest. The purpose of the second phase of the project is to develop a similar boundary element model that can take account of a potential flow. This work is still in an initial phase; at present calculations of scattering of sound fields by hard bodies in the presence of potential flow have been validated. The work is based on a transform technique that is valid for Mach numbers up to 0.3.

Department of Acoustic Technology
NLR
Office National d'Etudes et Recherches Aérospatiales
Turbomeca
Aerospatiale
BMW Rolls-Royce GmbH
Rolls-Royce plc
National University of Ireland
KTH - Royal Institute of Technology
Gradient
Institute of Sound and Vibration Research
Period: 01/02/1998 → …
Number of participants: 2
Project participant:
Jensen, Morten Skaarup (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 1,500,000.00 Danish Kroner
**Calibration of pistonphones and sound calibrators, EA/Ac1**

International comparison between 37 laboratories in 16 countries on calibration of Pistonphones and Sound Calibrators organized under EA/C2 (European co-operation for Accreditation). Project leader and pilot laboratory. 2 sets of pistonphones (B&K type 4228) and Sound Calibrators (B&K type 4231) was calibrated in January 1998 and has since then circulated among the participating laboratories. An intermediate recalibration took place in August 1998 and the circulation was finished in January 1999. A final recalibration took place in February-March 1999 and the final report on the results was released in December 1999.

Department of Acoustic Technology  
Period: 01/01/1998 → 01/01/2000  
Number of participants: 1  
Project Manager, organisational:  
Rasmussen, Knud (Intern)

**Simulation of outdoor acoustics**

Sound outdoors is relevant for environmental issues as well as in relation to communication and communication systems. Examples are warning systems, public address systems and outdoor concerts. In 1999 effects of topography on outdoor sound have been investigated and the influence of very weak wind has been investigated. The results were reported at a Symposium on Long Range Sound Propagation at Penn State. A MSc project has been initiated and a cooperation with Risø has been initiated.

Department of Acoustic Technology  
Period: 01/01/1998 → …  
Number of participants: 1  
Project Manager, organisational:  
Rasmussen, Karsten Bo (Intern)

**Statistical Energy Analysis Thematic Network (SEANET)**

High frequency vibration problems are very common in complex structures, where they constitute a major cause of interior and exterior noise. An approach called Statistical Energy Analysis (SEA) now has the capability to address such problems and to identify how the vibrations are distributed in the subsystems of complex structures, e.g., machinery, transportation vehicles and space structures. The objectives of establishing the thematic network SEANET are to bring together existing research efforts in the SEA field through active networking, and to overcome the barriers which exist today between the academic research on SEA and its application to industrial problems. This will also include the preparation for the transfer of knowledge from university to industry. This action will include realisation of a number of industrial validation cases by cooperative teams from research institutes and industry. The network consists of 12 university groups involved in major SEA research, 7 industrial end-users of different sectors (automobile, components, railways, ships, aeronautics and aerospace) and 9 small industries and industrial research centres. Contract begins 1 January 1999.

Department of Acoustic Technology  
Department of Electrical Engineering  
Leuven Measurements and Systems  
Aerospatiale  
Construcciones Aeronáuticas SA  
Dornier Luftfahrt  
Renault Recherche et Innovation  
Centro Ricerche FIAT  
Rieter Automotive France  
Duewag  
Defence Research Agency  
Aeronautical Research Institute of Sweden
Stereo signals
Various aspects of stereo are investigated including localization capabilities of various recording systems and problems related to masking and bit-rate reduction. A manuscript is under preparation in collaboration with Martin Vestergaard (Oticon Research Centre) and Torben Poulsen.

The influence of the environment on the sound power output of a source of low impedance
Whereas it has been known for years that the radiated sound power of a source of high acoustic impedance with appropriate spatial averaging equals the free field sound power in a reverberation room, the influence of the room on the sound power output of a source of low acoustic impedance has not received a similar attention. On the basis of theoretical considerations some authors have maintained that the sound power output of such sources would be reduced in reverberant surroundings, but this has never been verified. However, this is a matter of some concern, since standardised reference sources are aerodynamic sources of low acoustic impedance. A theoretical and experimental investigation of the matter has been carried out. No systematic influence has been found. Most of the computer simulations and all the experiments were carried out by Lars Mikael Verholt as a part of his MSc thesis work.

The influence of the environment on the sound power output of a source of low impedance
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Financing sources
Source: Unknown
Name of research programme: Undef
Amount: 135,000.00 Danish Kroner
Project
Noise from neighbours - with focus on low frequencies

With an increase in the use of light building constructions, problems have arisen at low frequencies where these types of constructions unlike the traditional heavy constructions cannot provide sufficient sound insulation. The measurement methods of today's building regulations do not consider frequencies below 100 Hz, and thus problems often appear in new buildings even when they comply with the demands in the normal frequency range. The purpose of the project is to evaluate the annoyance caused by a change in the low frequency level below 100 Hz by the use of subjective listening test. Frequency filters for five construction types, ranging from light to heavy constructions, have been created and applied to sound examples of three types of noise, two of impact noise and one of airborne noise. The presentations represented building constructions that would produce the same measurement results with the normal methods, although the A-weighted levels were different. Listening test were carried out with 25 test subjects, each of whom evaluated 24 presentations twice. The experiments have shown that an increase in the level at low frequencies produces greater annoyance, and thus it can be concluded that the traditional measurement methods are no longer adequate and a revision should be considered. One of the conclusions was that female subjects appeared to be much more annoyed by noise than male subjects.

Department of Acoustic Technology

DELTA
Period: 01/11/1997 → 30/04/1999
Number of participants: 4
Project participant:
Rindel, Jens Holger (Intern)
Mortensen, Frank Rysgaard (Intern)
Gade, Anders Christian (Intern)

Project Manager, organisational:
Jacobsen, Finn (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 979,000.00 Danish Kroner

Application of the Odeon program in underwater acoustics

A cooperation between the Department of Acoustic Technology (AT) and the Institute of Naval Research in Norway was arranged in the autumn of 1997. The issue was to apply the ODEON program, which has been developed for room acoustic calculations, to underwater acoustic modelling of Norwegian fjords. Introducing a sound velocity of 1500 m/s and a frequency dependent absorption coefficient associated with the other medium is the only change made in ODEON. The Norwegian fjords are approximately 500-1000 m wide, and the maximum depths can range from 100 to 600 m, which in an underwater acoustic context can be regarded as shallow water conditions. Although the medium is not homogeneous (temperature and salinity vary with depths and position and therefore the speed of sound will do the same), the relatively small distances in the geometry make it acceptable to omit refractive effects. AT has received raw data from acoustic measurements made in some fjords. However, because the original excitation was not available, it was necessary to solve the particular problem of determining the impulse response of a system from the response of the system to a swept sine signal that is not available. A method of synchronising the excitation and the response by maximising the coherence was developed, tested on various known systems, and finally applied on real data from the fjord. The resulting impulse responses made it possible to calculate the reverberation time. The last phase of the project concentrated on modelling the fjord with the room acoustic calculation model Odeon. Since Odeon has been developed for a quite different purpose, the main objective was to determine the Odeon parameters that give the best agreement with the experimental results (number of rays, reflection order etc).

Department of Acoustic Technology
Number of participants: 4
Project participant:
Wendelboe, Gorm (Intern)
Christensen, Claus Lynge (Intern)
Rindel, Jens Holger (Intern)

Project Manager, organisational:
Jacobsen, Finn (Intern)
Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 465,000.00 Danish Kroner
Project

Sound Source Reconstruction using inverse Sound Field Calculations
Department of Acoustic Technology
Period: 01/08/1997 → …
Number of participants: 5
Phd Student:
Schuhmacher, Andreas (Intern)
Main Supervisor:
Rasmussen, Karsten Bo (Intern)
Examiner:
Juhl, Peter Møller (Intern)
Bohineust, Xavies (Ekstern)
Bolton, John Stuart (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Erhvervsforskerordningen
Project: PhD

Sound source reconstruction using inverse sound field calculations
In principle it is possible to determine a sound field from measurements of the sound pressure at a finite number of positions. The objective of the project has been to investigate inverse calculations in connection with source reconstruction. The inverse process is normally a reconstruction process, ie the task is to determine the sound source that has generated a given sound field from observations of the sound field. When a sound source is reconstructed, that is, when the physical quantities pressure and normal velocity are known everywhere on the surface, it is possible to calculate the sound field surrounding the sound source. Afterwards, modifications of the sound source can be simulated, and the influence on the radiated sound field is immediately observed. The major problem with inverse methods is to achieve a stable solution, that is, to identify the vibrational pattern of the surface of the source from measurements of the sound field in the vicinity of the source and make sure that it is not highly sensitive to unavoidable measurement errors. If care is not taken, noise will pollute the sound field measurements, and a meaningless vibration pattern on the surface of the source is obtained. Thus, it is extremely important to consider different techniques in order to find one that provides a stable solution.

Department of Acoustic Technology
Period: 01/02/1997 → 30/11/1999
Number of participants: 1
Project Manager, organisational:
Rasmussen, Karsten Bo (Intern)
Boundary Element calculations at high frequencies
The purpose of this project has been to investigate the possibilities of extending boundary element calculations to higher frequencies. One feature of the boundary element method is the division of the object(s) in question into small surfaces — boundary elements. For an accurate calculation these elements must be small compared with the wavelength — two to five elements per wavelength are often used. Since the computational effort in terms of calculation time and storage required increases dramatically with the number of elements, boundary element calculations are often limited to relatively low frequencies. An approximate boundary element formulation for the solution of high frequency problems, the plane wave approximation, has been examined; it was found that the accuracy of this formulation was dependent of the problem. For the standard boundary element approach, which is accurate for any problem, the possibility of using iterative methods for solving the resulting system of equations has been investigated. It was found that the quasi-minimal-residual method is very well suited for acoustic boundary element computations, and leads to far less calculation time. With regard to the storage required it was found that for some problems a substantial number of terms could be neglected in the boundary element matrices without significant loss of accuracy. The project has been financed by the Danish Technical Research Council.

Department of Acoustic Technology
Period: 01/01/1997 → 31/12/1997
Number of participants: 1
Project Manager, organisational:
Juhl, Peter Møller (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 526,200.00 Danish Kroner

Comparison methods for microphone free-field calibration (EUROMET project no 400)
The aim of the project, which is carried out under the auspices of EUROMET, is to develop a technique for free-field calibration of measurement microphones by comparison with laboratory standard microphones. Reflections from the set-up combined with the uncertainty in positioning the microphones often result in unacceptably large calibration errors. The reflections from the source and from the mechanical structures are studied together with methods of analysis based on time-selective measurements in order to reduce the influence on the resulting calibration uncertainty.

Department of Acoustic Technology
Period: 01/01/1997 → 30/12/1997
Number of participants: 2
Project participant:
Olsen, Erling Sandermann (Intern)
Project Manager, organisational:
Rasmussen, Knud (Intern)

Intercomparison on pressure calibration of laboratory standard microphones (EUROMET project no 399)
The project comprises fifteen national metrology institutes in Europe and is carried out under the auspices of EUROMET. An intercomparison has been conducted between the Danish Primary Laboratory on Acoustics, National Physical Laboratory, UK, and Physikalisch Technische Bundesanstalt, Germany, during 1997, where four microphones of type B&K 4160 and 4180 have been exchanged. Each of these laboratories will serve as a centre for four other institutes. The Danish Primary Laboratory on Acoustics will conduct calibrations for Austria, Spain, Sweden and Switzerland.

Department of Acoustic Technology
Period: 01/01/1997 → 01/01/2000
Number of participants: 1
Project Manager, organisational:
Rasmussen, Knud (Intern)

Prediction of random errors in sound intensity measurement
It is well known that the random errors of sound intensity estimates can be much larger than the theoretical minimum value determined by the BT-product, in particular under reverberant conditions, in the near field of structural sources, and when there are several independent sources present. More than ten years ago it was shown that one can predict the random
errors of estimates of the sound intensity in, say, one-third octave bands from the power and cross power spectra of the two signals from a sound intensity probe, determined with fine spectral resolution with a dual channel FFT analyser. That is not very practical, though. This work demonstrated that one can predict the random errors from the power and cross power spectra determined with the same spectral resolution as the sound intensity itself.

Vibratory strength of machinery sources and structural power transmission
Audio frequency vibrations from machinery installations often result in noise problems caused by transmission of vibrations to connected structures and associated sound radiation from vibrating panels, etc. In practice, predictions based on energy methods such as statistical energy analysis (SEA) are mostly used for estimating the relative energy distributions of structures subject to broadband excitation from idealised sources. However, little attention has been paid to include the vibratory strength and power input from real machinery sources, although such data are required for an absolute response prediction. One apparent reason is that the actual characterisation of vibratory sources is still in a development stage, and there is no standardised method for measuring the vibratory strength of machinery sources. This fundamental problem has been addressed, and a new method has been proposed for characterising multi-point connected sources. The overall strength of a source is determined by the sum of absolute values of its terminal complex powers. From results of the present investigation this method appears to be well suited for input power predictions in SEA. From an approximate estimate of the averaged source energy this study has furthermore revealed that there is a simple relation between the averaged coupling quantity used in a deterministic prediction of power transmission and the coupling loss factor commonly used in SEA.

Detecting gas leaks by ultrasonic emission
The emission of noise in the frequency range from 10 to 25.6 kHz from an experimental gas leak in a flanged joint has been investigated experimentally. The overall conclusion is that the emitted noise level is almost independent of the frequency within the considered frequency range. A small PC-program for estimation of the attenuation of sound during free field propagation outdoors has been developed and used for simulations. A number of curves of sound attenuation under varying temperature and humidity conditions have been calculated. A crude overall estimate is provided. Computer simulations of the influence of the ground reflection on the received sound level have been carried out. These simulations have been carried out for the case of no wind and for one downwind and one upwind example. One of the conclusions is that the receiver should be located several metres over the ground in order to reduce the influence from upwind conditions. Most of this investigation took place in 1996, but the report was written in 1997. The project was carried out in cooperation with Innova Air Tech Instruments.

Spatially extended sound equalisation in rooms
The motivation of this PhD project is the fact that sound reproduced in a normal listening room undergoes a spectral colouration, which is an undesirable effect. The objective of the work has been to study the extent to which sound can be
reproduced without spatial fluctuations and spectral colouration in a region in a room as large as possible, over a frequency range as large as possible, and using as few loudspeakers as possible. The problem has been studied theoretically using computer simulations, both in the frequency domain approach and with a time domain approach. Experiments in a flat (two-dimensional) enclosure have also been carried out. One of the conclusions of the study is that it is a much better strategy to generate a plane travelling wave than to try to obtain the same response in amplitude and phase; the equalised region can be larger and the frequency range can be wider. For example it has been shown that a plane wave travelling in a certain direction can be generated in a room of 2.9x3.6x2.5 m at frequencies up to 320 Hz by using 32 loudspeakers. Supervisor: Finn Jacobsen

Department of Acoustic Technology
Department of Electrical Engineering
Period: 01/09/1996 → …
Number of participants: 1
Project Manager, organisational:
Orozco, Arturo (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 210,000.00 Danish Kroner
Project

Calibration and accuracy requirements for vibro-acoustic power measurements
The piezoelectric transducer principle used in accelerometers and force transducers generally provides good linearity and fine overall characteristics both in frequency and dynamic range. In such applications the principle is associated with only small deviations from the true values in amplitude and phase, and these are usually of little importance in most vibration measurements. However, the deviations cannot be ignored in measurements of complex mobilities or impedances and in measurements of the vibratory power that sources inject into structures, or the power which is transmitted between connected structures. It has been found that very strict requirements are needed for power measurements, especially with respect to the phase accuracy at off-resonant conditions. The purpose of this project has been to examine the causes of uncertainties in measurements with accelerometers and force transducers. A small bias error associated with the piezoelectric principle has been identified and quantified. By the use of simple models it is shown that the structural damping of the transducers is responsible for a phase error, which by far is the most serious one in measurements of vibratory power. From results of the limited number of accelerometers and force transducers tested the phase errors are found to be in the order of one degree and half a degree, respectively. In dual channel measurements it is only the relative error between the measured force and acceleration that is important. For a set of sensors this bias error can be compensated for both in amplitude and phase, at least to first order, by performing a broadband absolute calibration using an ideal mass. What remains after such a correction is only small residual errors, which reflect the uncertainty of the calibration itself and differences in transducer mounting. The experimental results indicate that these uncertainties will be +/-1% for the relative amplitude error and +/-0.2 degree for the phase error.

Department of Acoustic Technology
Period: 01/06/1996 → 30/12/1997
Number of participants: 2
Project participant:
Henriksen, Eigil (Intern)
Project Manager, organisational:
Ohlrich, Mogens (Intern)

Calibration of transducers for vibro-acoustic power measurements
The piezoelectric transducer principle used in accelerometers and force transducers generally provides good linearity and fine overall characteristics with respect to frequency and dynamic range. Another quality of this measurement principle is that the deviations from the ideal (flat) amplitude and phase characteristics are small and of little importance in most vibration measurements. However, the deviations cannot be ignored in measurements of complex mobilities and in measurements of the vibratory power that sources inject into structures, or the power transmitted between connected structures. It has been found that very strict requirements are needed for such vibro-acoustic power measurements, especially with respect to the phase accuracy at off-resonance conditions. The purpose of this project (initiated in the ASPEN project mentioned above) is to investigate the possible causes of uncertainties in measurements of vibratory power with accelerometers and force transducers. Simple analytical models and experiments have revealed that the structural damping of the transducers is responsible for small phase errors. Tests of a number of accelerometers (of B&K types 4344 and 4375) and force transducers (of B&K type 8200) have shown that their absolute phase errors are typically about 1.2° and 0.5°, respectively. This corresponds to a relative phase error of 0.7° between the measured transducer signals of acceleration (or velocity) and force, and this is what matters in power measurements. It has also been found that instrumentation phase errors of transducer preamplifiers may contribute significantly, giving an overall bias error in power
measurements of up to 1.5° at mid and high frequencies, and considerably more at low frequencies. Fortunately, this error between measurements channels can be compensated for at fixed settings by performing a broadband, absolute calibration with an ideal mass.

**Measurement of instantaneous intensimetric quantities and their physical interpretation**

Various different sound intensity concepts have been suggested. The purpose of this investigation was to examine experimentally a new decomposition of the instantaneous intensity into an active and a reactive part, proposed by Domenico Stanzial and Nicola Prodi from CIARM, and compare the results with an alternative one, proposed ten years ago by Richard Heyser. One of the results is that there is no general relation between the various quantities, although they are identical in some simple sound fields.

**Active control of noise radiation from vibrating structures**

The purpose of this PhD study has been to investigate the use of active noise control to reduce unwanted sound radiation from vibrating panels such as the ones forming the fuselage of an aeroplane, the housing of a large machine etc. The principle of active noise control is to reduce unwanted noise from a primary sound source by adding 'anti noise' with secondary sources, resulting in destructive interference and reduced overall noise. This particular study has focused on ways to control and alter the vibrations of a panel by active means in order to reduce the overall sound radiation from the panel. Secondary vibration sources act directly on the panel to introduce a secondary vibration field in the panel. The work has concentrated on optimal robust feedback control. In 1999 all the time has been spent on writing the thesis "Active control of noise radiation from vibrating structures". Supervisor: Finn Jacobsen Co-supervisor: Mogens Ohlrich

**Financing sources**

Source: Unknown
Name of research programme: Ukendt
Amount: 380,000.00 Danish Kroner

**Field indicators in sound power determination**

A considerable number of 'field indicators' or 'quality indicators' have been proposed in connection with sound power determination based on measurement of sound intensity. The purpose of this investigation has been to examine these quantities. The conclusion is that some of the quantities are of obvious utility because they have simple relations to certain errors. However, other quantities have been found to be more vaguely related to measurement accuracy, and still others have no obvious physical meaning.

**Field indicators in sound power determination**

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A control method for test of the attenuation of ear-plugs for musicians
Custom-moulded earplug for musicians and audience are used more and more. The plugs are relatively expensive compared with ordinary hearing protectors, because they are made from an impression of the individual user's ear-canal and outer ear. A simple method is needed to test the attenuation of the plug for the individual user. Therefore a comparison has been made between measurements carried out in accordance with the standard hearing protector method (ISO 4869-1, Hearing threshold determinations with one-third octave noise in a special diffuse field) and the simpler sound field audiometry method (ISO 8253-2). Almost every audiological clinic in Denmark uses the latter method, and therefore test facilities for a simple control test are available. The experimental work is finished, and the results are presented in the report (in Danish): 'Måling af høreværnsdæmpning via fritfeltsaudiometri,' Teknisk Audiologisk Laboratorium, Sdr. Boulevard 29, DK-5000 Odense C. The project has been carried out in collaboration with Bjørn Knud Andersen, Technical Audiological Laboratory, Odense.

Department of Acoustic Technology
Department of Electrical Engineering

Technical Audiological Laboratory
Period: 01/01/1996 → …
Number of participants: 1
Project Manager, organisational:
Poulsen, Torben (Intern)

Calibration of audiometric headphones
The work is a part of a cooperation between European metrology laboratories under the auspices of EUROMET. An automatic method has been developed to calibrate audiometric headphones in the frequency range up to 20 kHz. A number of high frequency headphones have been calibrated and are now circulating among the participating laboratories for calibration. Similarly three standard type audiometric headphones have been received from NPL and returned after calibration. Comparison and reporting of the results is expected in 1997.

Department of Acoustic Technology
Laboratoire National d'Essais
National Physical Laboratory
OFMET
Physikalisch-Technische Bundesanstalt
SINTEF
Statens Provningsanstalt, Borås
Period: 01/01/1996 → 30/12/1996
Number of participants: 2
Project participant:
Olsen, Erling Sandermann (Intern)
Project Manager, organisational:
Rasmussen, Knud (Intern)

Convergence of the direct boundary element method
The boundary element method is one of the best known numerical formulations for acoustic computations. Despite the fact that many researchers have used this method for solving acoustic problems, the theoretical foundation of the method is not well known in the acoustic community. Work on convergence in 1997 has concentrated on compiling the results on convergence of boundary element formulations in the mathematical literature and on developing a more intuitive approach to a convergence theory. A paper on this study combined with results found last year has been accepted for publication in the Journal of Sound and Vibration. The work was financially supported by the Danish Technical Research Council.

Department of Acoustic Technology
Period: 01/01/1996 → 31/12/1997
Number of participants: 1
Project Manager, organisational:
Juhl, Peter Møller (Intern)
**Financing sources**
Source: Unknown
Name of research programme: Udenkt
Amount: 854,960.00 Danish Kroner

**Equivalent threshold sound pressure levels for Sennheiser HDA 200 earphone and Etymotic Research ER-2 insert earphone**
Equivalent threshold sound pressure levels have been determined for the Sennheiser HDA 200 earphone and the Etymotic Research ER-2 insert earphone. Thirty-one young test subjects with normal hearing participated in the investigation, and the thresholds were determined at all recommended frequencies in the frequency range from 125 Hz to 16 kHz. The results determined with the HDA 200 earphone are generally in very good agreement with the results from the only two other investigations available at present. At 6 kHz a deviation of 9 dB has been found, and at 8 kHz a 6-dB deviation occurred between the three investigations. The work is based on a MSc thesis by Loc A Han. A paper (Han and Poulsen) has been published in Scandinavian Audiology, vol 27, 1998.

**European intercomparison test on hearing protectors**
Intercomparison tests on hearing protectors is carried out at a number of European test institutes. Real ear attenuation at threshold is measured in accordance with EN 24869-1, and for muff-type protectors the insertion loss of each individual cup is determined in accordance with EN 352-1, paragraphs 7.11 - 7.11.3.3. The intercomparison is coordinated by Vertical Group 4, Hearing Protectors, under the European certification administration of personal protective equipment.

**Nordic Round Robin Test on Hearing Protectors**
The sound field requirements in the hearing protector standard ISO 4869-1 are under discussion at present and should be changed in a coming revision of the standard. The test facilities available to the members of the Nordic HAKK-group cover various ways to fulfill the sound field requirements. Therefore a Round Robin Test has been initiated with the aim of determining — and comparing between laboratories — the attenuation of two hearing protectors of the muff type and one of the plug type. In 1999 the results were presented to ASA(Boston), at EAA/ASA conference, Berlin, at 6ICSV, Lyngby and at various working group meetings. In 1999 some sound field measuremets have been performed at the participating laboratories. These measurements will continue in year 2000.

**Online plant modelling methods for active control of sound and vibration**
Active control systems that use the popular filtered-x adaptive algorithm require so-called plant models to describe the relation between the secondary source outputs and the error sensor inputs in order to ensure convergence. For most laboratory experiments reported in the literature the plant models have been identified a priori and have remained fixed during the control experiment itself. This approach is viable as long as the physics of the plant does not change drastically during the experiments. However, for long-term practical applications an online plant identification scheme may be required, which continuously adapts the plant model to the possibly changing environment. Especially two of the methods suggested in the literature seem appropriate for this purpose. One method uses a low level probe noise and a standard LMS adaptive filter to model the plant, whereas the other method models both the primary and secondary plant responses using a projection algorithm. The objective of this work has been to investigate these two approaches of online plant modelling in multichannel active control systems, and to compare their performance. This has been done by means of...
computer simulations, which readily allow for reference results to be established. For a broadband random disturbance the
first approach was found to give results that were very close to the theoretically optimal ones, whereas the results
obtained for sinusoidal disturbances were less impressive. In the latter case the choice of plant model filter length and
spectral shape of the probe signals turned out to be critical. The other approach, which involves 'complete' system
identification, gave seemingly convincing results, as convergence was always obtained. However, in some cases the
steady state performance could be quite far from optimal, because the secondary plant models provided by the estimation
algorithm were erroneous.

Department of Acoustic Technology
Period: 01/01/1996 → 31/07/1996
Number of participants: 1
Project Manager, organisational:
Laugesen, Søren (Intern)

Outdoor sound propagation under the influence of wind and screens
The influence of screens on outdoor sound propagation is well established under neutral atmospheric conditions, and the
influence of wind on sound propagation over a plane surface has also been investigated. The combination of wind and
screen is, however, much more complicated to deal with and has not been investigated in detail before. The present
investigation is carried out by means of the scale model facility at the department where the experimental results have
been obtained. These results have been compared with Parabolic Equation calculations of the Cranck-Nicolson type
taking into account laminar flow before and after the screen. A more accurate description of the flow pattern around the
screen has been developed and included in the acoustic simulations. A paper has been published in Journal of the

Department of Acoustic Technology
Period: 01/01/1996 → 30/12/1998
Number of participants: 1
Project Manager, organisational:
Rasmussen, Karsten Bo (Intern)

Outdoor sound reinforcement systems
High quality sound reproduction is very difficult to obtain under outdoor conditions. This is partly due to the high sound
power levels necessary for reproduction at a suitable level at the location of the listeners, and partly due to the acoustic
environment. The loudspeaker arrangements are basically located over an impedance surface without any acoustic
support from wall reflections and room resonances. Under such circumstances it is very difficult to obtain a satisfactory
frequency response and at the same time avoid echo effects due to multipath propagation. An advanced computer model
for sound radiation from horn-type outdoor sound reinforcement loudspeakers, developed and tested in an MSc project by
Andreas P. Schuhmacher in 1996, has been further investigated and a manuscript has been accepted for publication in
Applied Acoustics.

Department of Acoustic Technology
Period: 01/01/1996 → 31/12/1998
Number of participants: 1
Project Manager, organisational:
Rasmussen, Karsten Bo (Intern)

Prediction of noise in industrial halls
The ODEON program has been further developed in 1997. A completely new version has been developed for Windows95.
Currently research is directed towards improving the model for calculations in industrial environment, where the sound
sources cannot be considered to be point sources. Typically the sources are very large and contribute with reflecting
surfaces to the room. Therefore, surface sources and line sources have been developed in addition to point sources with
frequency dependent directivity. The frequency range of the calculations has been extended to eight octave bands
covering the range from 63 Hz to 8 kHz. As a special new feature it has been made possible to define surfaces as partly
transparent. This is useful in modelling industrial halls. The program has recently been verified by Elsamprojekt. In a
turbine hall at a power plant the A-weighted sound pressure level was measured at twelve receiving points and compared
with the levels estimated by the ODEON program. The room was modelled by 54 surfaces, and sound sources were
modelled by 30 surface sources (the surfaces of two turbines) and four point sources (bullet bearings). Relevant data for
radiated sound power were measured with the intensity method. The test results show very high correlation between
measured and estimated results, the average deviation being less than 1 dB. The project is carried out in collaboration
with I/S Elsam, Elkraft A.m.b.A. and Elsamprojekt A/S Power Station Engineering.
The binaural free-field hearing threshold for pure tones
The binaural free-field hearing threshold for pure tones has been measured for thirty-one otologically normal test subjects (age: eighteen to twenty-five years). The pure-tone signals were 0.125, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 4, 6, 8, 9, 10, 11.2, 12.5, 14 and 16 kHz. The duration of the signals was 1 s. The thresholds were determined with the bracketing method (ISO 8253-1, full version with three ascends and three descends) using a step size of 5 dB. The results are in good agreement with ISO 226 and ISO 389-7 at frequencies below 1 kHz and with other recent determinations of the free-field hearing threshold at high frequencies. At 1500 Hz a small peak in the threshold occurs, which is not reflected in the present standards due to lack of measurements at this frequency. The work is based on a MSc thesis by Loc Han. A paper (Poulsen and Han) has been accepted for publication during year 2000 in Acustica united with Acta Acustica.

The influence of wind on the performance of noise screens
The effect of wind on the performance of a noise screen has been studied. Based on wind tunnel experiments and numerical computations of flow over an obstacle, an analytical approximation of the wind speed field near a noise screen has been developed. The wind speed field is used for numerical computations of downwind sound propagation over a screen, performed with the parabolic equation method. For some source-screen-receiver configurations it is found that the effect of wind on the performance of a screen is substantial. Further, it is found that the effect of screen induced wind speed gradients cannot be ignored in many situations.

The sources of error in measurement of sound transmission loss
Since the first time sound intensity measurements were used in determining the sound transmission losses of partitions more than 15 years ago, a number of investigations have indicated systematic deviations between results obtained with the traditional method and intensity-based estimates. The various sources of error of both methods have been analysed and examined experimentally. Both types of measurements can be subject to several fairly small systematic errors of comparable size. However, the conclusion of this investigation was that there are no systematic deviations if the measurement procedures are very careful. This investigation was initiated during Ding Hui’s stay at the Department of Acoustic Technology in 1993.
A numerical and experimental investigation of the performance of sound intensity probes at high frequencies

The upper frequency limit of sound intensity probes with a certain microphone separation distance has generally been considered to be the frequency at which an ideal probe that does not disturb the sound field would exhibit an acceptable finite difference approximation error. However, a numerical investigation has indicated and an experimental investigation has confirmed that the resonance in front of the cavities of the microphones to some extent compensates for the finite difference error. A practical conclusion is that a probe with half-inch microphones separated by a 12-mm spacer performs very well in sound power determination up to 10 kHz, which is an octave above what has hitherto been considered to be the upper frequency limit of this configuration. The investigation was initiated during Vicente Cutanda's stay at Department of Acoustic Technology in 1995. In 1996 the efforts have been concentrated on testing the validity of the numerical findings under a variety of sound field conditions.

Department of Acoustic Technology
Period: 01/09/1995 → 31/12/1996
Number of participants: 3
Project participant:
Juhl, Peter Møller (Intern)
Cutanda Henriquez, Vicente (Intern)
Project Manager, organisational:
Jacobsen, Finn (Intern)

Error study of boundary element calculations involving close meshes

In the numerical literature certain body shapes have been known to give rise to erroneous solutions when the standard boundary element formulation is used. A prominent example is the thin disc, for which the erroneous behaviour is termed the 'thin shape breakdown' of the boundary element method. The problem appears to be due to the two close meshes on either side of the disc. In relation to a numerical study of sound intensity probes the need to model two closely spaced bodies has arisen. In this study it was found that the close meshes forming the gap between the spacer and the microphones in an intensity probe give rise to a breakdown similar to that of the thin disc. However, the methods used to overcome the problem for the disc case cannot be used for the gap case, and hence a study of the error for the two cases was carried out. Two features of the behaviour of the error were found. For rough meshes, ie meshes where the element length was larger than five times the gap width or disc thickness, the solution was largely in error and showed no convergence. For finer meshes the error is dramatically reduced and normal convergence behaviour is found. The work was financially supported by the Spanish Ministry of Education and Culture and by the Danish Technical Research Council.

Department of Acoustic Technology
Period: 01/09/1995 → 30/12/1997
Number of participants: 3
Project participant:
Jacobsen, Finn (Intern)
Cutanda Henriquez, Vicente (Intern)
Project Manager, organisational:
Juhl, Peter Møller (Intern)

Energy distribution of structureborne sound in built-up structures

Noise from machinery and in vehicles is often caused by the structural vibrations of components and panels. Reducing such noise therefore requires that one can predict the energy distribution and vibration levels of quite complex structures. The so-called Statistical Energy Analysis (SEA) has proved to be a useful and reliable method if the structure has a high modal density. This is usually the case at high frequencies, but the assumption may be violated in the acoustically important mid-frequency range where the modal density of practical structures is often only moderate or even low. In this project it has been demonstrated that the inherent requirement of SEA can be relaxed if the re-transmission of power between coupled, finite subsystems is taken into account by a mean value calculation. This makes it possible to predict the energy distribution of the subsystems, and results in a coupling loss factor that can be used in an SEA prediction also at a moderate modal density. The method is based on a 'ray tracing' approach that involves the Helmholtz number of each element and the reflection and transmission coefficients of the connections. This approach has been examined for power transmission by flexural waves in coupled beam structures, and the results have been published in the Journal of Sound and Vibration in 1998.

Department of Acoustic Technology
Period: 01/08/1995 → 01/02/1998
Number of participants: 2
Sound insulation in dwellings at low frequencies
This is a pilot project with the aim of throwing some light on the subjective evaluation of the annoyance of noise from neighbours, with a focus on low frequencies. The project was divided into field investigations and experiments in the laboratory. The field investigation was carried out by the Danish Building Research Institute in six selected housing areas. The laboratory experiment was carried out as a pilot project in order to investigate how the assessment of noise from neighbours is influenced by various factors. Twenty test persons have been asked to evaluate series of typical noise from neighbours, i.e. two kinds of airborne noise (music and the sound track from a film) and two kinds of impact noise (footfall noise with and without shoes). The noise examples were presented with two different shapings of the frequency spectrum in order to simulate either a heavy building construction or a typical lightweight construction. The noise examples were presented at four different levels and combined with two levels of background noise. The two frequency shapings were different in the frequency range 25 - 200 Hz, but identical at higher frequencies. Dose-response curves have been derived for annoyance, disturbance of concentration and subjective loudness. For annoyance was found a considerably steeper slope of the dose-response curve than for disturbance and loudness. 50 % of the subjects felt annoyed by the impact or airborne noise at a level of 28 or 27 dB(A), respectively. For both types of noise was found that the interval between 20 % and 80 % annoyed corresponded to a level difference of 16 dB. It was not possible to draw any firm conclusions about the influence of light or heavy building constructions, but the pilot project has given useful information for the design of future experiments on this topic. The main project is expected to start in 1997.

Department of Acoustic Technology
Danish Building Research Institute
Period: 01/03/1995 → 31/03/1996
Number of participants: 3
Project participant:
Poulsen, Torben (Intern)
Nielsen, Jesper Rye (Intern)
Project Manager, organisational:
Rindel, Jens Holger (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 362,000.00 Danish Kroner

Hearing conservation programme
The Nordic HAKK-group has prepared a booklet (in Swedish) with information about a Hearing Conservation Programme to be used in industry. The HAKK-group comprises representatives from the hearing protector industry, labour protection institutes, audiological clinics and universities. The Danish member of the HAKK-group has served as editor during the collection of material for the booklet. The booklet is about 70 pages and was published in 1997.

Department of Acoustic Technology
Period: 01/01/1995 → 30/11/1997
Number of participants: 1
Project Manager, organisational:
Poulsen, Torben (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 404,350.00 Danish Kroner

Occlusion effects caused by earmoulds
Many people use earmoulds every day (e.g. hearing aid or hearing protection). Unfortunately, occlusion of the ear canal changes the perception of one's own voice. This 'Occlusion effect' is a major annoyance. In the PhD project it was showed that the experienced annoyance is correlated with the sound pressure in the occluded ear canal. The sound pressure generated from one's own voice is up to 30 dB greater in the occluded ear canal than in the open ear canal. The second
part of the project has been concerned with the physical mechanism causing the occlusion effect. The ratio between the sound pressure generated by airborne sound and the sound pressure transmitted through the body has been determined in a related MSc project by Carsten Bremmelgaard. Experiments with foam plugs contra hard acrylic moulds showed that soft plugs reduces the occlusion effect. The results have been used to develop a computer model of the occlusion effect from one's own voice. The project is an industrial PhD project with Oticon A/S as the industrial partner.

Department of Acoustic Technology
Period: 01/12/1994 → 31/03/1998
Number of participants: 1
Project Manager, organisational:
Hansen, Mie Østergaard (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 180,000.00 Danish Kroner
Project

Loudspeaker cabinet edge diffraction
Not only the loudspeaker units themselves, but also the shape of the loudspeaker cabinet determine the frequency response of a loudspeaker system. In this project models for predicting the influence of the cabinet diffraction are investigated, with the aim of improving the current models.

Department of Acoustic Technology
Period: 01/10/1994 → 31/01/1997
Number of participants: 1
Project Manager, organisational:
Agerkvist, Finn T. (Intern)

Numerical sound field calculations by coupling the finite and boundary element methods
For numerical calculation of sound fields at low and medium frequencies two numerical methods presently hold a dominating position: the finite element method (FEM) and the boundary element method (BEM). The finite element method is characterised by the division of the solution space into a finite number of elements. However, many applications in acoustics involve an infinite domain, for example radiation into free space, which is difficult to handle with the FEM. Such problems may be handled efficiently with the BEM. A number of acoustic design and noise problems involve a finite domain that is coupled to free space by an opening. A promising strategy to treat such problems seems to be a coupling of a FEM calculation for the interior problem with a BEM calculation for the exterior problem. Since a direct coupling of the two methods destroys the desired symmetric and bandlimited structure of the FEM matrices, an iterative approach has been investigated. The iterative approach appears to be an efficient method of coupling the two methods, but it was found that for some problems the iteration does not converge to a solution. Further investigations into the convergence and accuracy of the BEM revealed that discontinuities in a geometry cause the particle velocity to tend to infinity near the discontinuity. In the iterative approach the particle velocity on the surface separating the two domains is one of the free variables that must be iterated to a solution, and hence this surface must be chosen far from any geometric discontinuities. Another problem was the eigenfrequencies of the interior problem, which appear in all closed domains. It was found that introducing losses in the interior model was important to ensure convergence at all frequencies.

Department of Acoustic Technology
Period: 01/09/1994 → 31/12/1996
Number of participants: 1
Project Manager, organisational:
Juhl, Peter Møller (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 854,960.00 Danish Kroner
Project

Temporal integration of loudness as a function of level
Temporal integration, ie the increase in loudness as a function of the duration of the signal, is investigated for brief tones and for noise bursts at different overall levels. Loudness matches between short and long signals (typically of durations of 5 and 200 ms) are obtained from levels close to the hearing threshold to levels well above the threshold. The aim of the investigation is to determine the loudness function for these sounds for both normal hearing and hearing-impaired persons. The project is carried out in collaboration with Mary Florentine and Søren Buus, Northeastern University, Boston,
USA, and investigations on very steep hearing losses were carried out during their stay at DTU from August to December 1999.

Department of Acoustic Technology
Period: 01/09/1994 → 30/12/1999
Number of participants: 1
Project Manager, organisational:
Poulsen, Torben (Intern)

Project

BRITE-EURAM II project ASPEN: Active control of structural vibration using power transmission method
In this international research project financed by the EU (BRITE EURAM II), a new method for active noise control has been examined. The method is based on minimising the total vibrational power supplied to a receiving structure. The main task of the Department of Acoustic Technology (AT) has been to develop and test an adaptive control algorithm for minimising a sum of measured power quantities and to implement this algorithm on a TMS320C30 signal processor. AT has tested the developed real-time control system at the Centre Technique des Industries Mécaniques (CETIM) in France. Based on the resulting experience the software has been further developed to include a calibration facility for the complete measurement system. Other control strategies have also been implemented, because all experimental tests showed that the performance of the power control system is very sensitive to phase errors between force and velocity. These alternative control strategies include minimising sums of squared velocities, sums of squared forces or a weighted sum of these quantities, as suggested by the Institute of Sound and Vibration Research (ISVR). The project was completed in the beginning of 1997 with a final experimental demonstration at CETIM of the performances of the different strategies for a source and receiver system with active vibration isolators, designed by ISVR. The project has been carried out in cooperation with Stephen Elliott, ISVR, and Goran Pavic, CETIM. The industrial partners of the project were Brüel & Kjaer, Thomson Sintra ASM, Sophia-Anti-polis, France, and Centro Ricerche Fiat, Torino, Italy.

Department of Acoustic Technology
University of Southampton
Centre Technique des Industries Mécaniques
Brüel & Kjaer A/S
Thomson Sintra ASM, Sophia-Antipolis
Centro Ricerche FIAT
Period: 01/01/1994 → 31/03/1997
Number of participants: 3
Project participant:
Laugesen, Søren (Intern)
Ohlrich, Mogens (Intern)
Project Manager, organisational:
Henriksen, Eigil (Intern)

Financing sources
Source: Unknown
Name of research programme: Uendt
Amount: 185,081.00 Danish Kroner

Acoustic finite element calculations in the time domain
The purpose of this PhD-project has been to study the particular problems that occur when the finite element method is used in solving acoustic problems in the time domain. The most serious error in time domain calculations is a falsely predicted dispersion phenomenon. The origin and the implications of this error have been studied, which has led to a new method of determining the optimum size of the elements and the time step. This is an essential part of reducing the memory requirements and calculation time in time domain finite element calculations. The project was finished by the end of August 1996. The activities in 1996 have concentrated on studying various methods of reducing the computational costs.

Department of Acoustic Technology
Period: 01/08/1993 → 31/07/1996
Number of participants: 1
Project Manager, organisational:
Jensen, Morten Skaarup (Intern)

Project
Effects of procedure and equipment on room acoustic measurement results
Based on acoustic measurements from concert halls in which data have been collected by the Department of Acoustic Technology and other researchers in parallel, the differences between the results from the different laboratories are investigated. The work aims at recommendations regarding procedures for carrying out room acoustic measurements in assembly halls. The project has been carried out together with National Research Council, Ottawa, Canada, and Statsbygg, Oslo, Norway.

Department of Acoustic Technology
Period: 01/08/1993 → 31/12/1996
Number of participants: 1
Project Manager, organisational:
Gade, Anders Christian (Intern)

Outdoor sound propagation
Department of Acoustic Technology
Period: 01/06/1993 → 27/11/1996
Number of participants: 4
Phd Student:
Arranz, Marta Galindo (Intern)
Main Supervisor:
Rasmussen, Karsten Bo (Intern)
Examiner:
Hald, Jørgen (Ekstern)
Roth, Ole (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsstip.-SU, Eksp
Project: PhD

BRITE-EURAM II project RHINO: Reduction of helicopter interior noise
The objective of this work is to develop measurement methods for determination of the vibratory source strength of the main rotor gearbox, which is considered to be the dominant source of structureborne noise in helicopters. Two novel measurement techniques have been developed for quantifying the vibro-acoustic source strength of lightweight helicopter gearboxes. The accuracy, robustness and implementation of these methods have been examined by a comprehensive investigation, comprising theoretical studies of simple multi-modal beam systems and extensive experiments with more realistic three-dimensional small scale models, and finally with large, detailed 3/4-scale test structures of a medium size helicopter. In addition partial verification tests of the methods have been conducted by flight trials and ground tests with a Eurocopter Deutschland BK117 helicopter in a joint effort by the three task partners; a full verification, however, which requires measurements in a gearbox test bench and measurements of the airframe dynamic properties with the gearbox removed, was beyond the budget of this task. Nevertheless, it is concluded that the equivalent source power methods have been developed to a stage where they can be implemented at the manufacturer. Moreover, the scale model predictions have revealed that the power transmitted to the fuselage is dominated by contributions in the axial direction of struts and tie-rods. Such information is valuable, for example, in the selection of control measures for reducing structureborne noise transmission to the fuselage, whether this is attempted by using passive dynamic neutralizers or by suitable actuators driven by an active control system.

Department of Acoustic Technology
Agusta. S.p.A.
Eurocopter France
Eurocopter
Westland Helicopters
DRA Aerospace Division
Office National d’Etudes et Recherches Aérospatiales
Institute of Sound and Vibration Research
The parabolic equation method for outdoor sound propagation

The parabolic equation method is a versatile tool for outdoor sound propagation. The present study has focused on the Cranck-Nicolson type Parabolic Equation method (CNPE). Three different applications of the CNPE method have been investigated. The first two applications study variations of the ground assuming a homogeneous atmosphere. Propagation of sound above a mixed impedance ground and up-slope sound propagation is investigated. In the third application the influence of the atmosphere is studied, characterized and implemented in the CNPE-model. The refraction of the sound due to the wind and temperature gradients and the scattering due to the turbulence of the atmosphere are taken into account in the calculations.

Department of Acoustic Technology

Distortion mechanisms in loudspeakers (LoDist)

Together with the Danish loudspeaker manufacturers AudioNord, Bang & Olufsen, DynAudio, Peerless and Vifa-Speak the Department of Acoustic Technology have participated in a joint research project on the reduction of distortion in loudspeakers. In 1997 the analysis of the measurements and the listening tests were completed, and the project was concluded with the preparation of a report. The software developed during the project for the preparation and investigation of the signals for the listening tests was presented at the 102nd Convention of the Audio Engineering Society in Munich, Germany, in March. The project has been supported financially by the Danish Agency for Development of Trade and Industry. The Danish Company Brüel & Kjær has supported the project with its technical resources.

Department of Acoustic Technology

AudioNord
Bang & Olufsen A/S
DynAudio
Peerless
VifaSpeak

Period: 01/11/1992 → 01/10/1997
Number of participants: 1
Project Manager, organisational:
Olsen, Erling Sandermann (Intern)
Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 2,427,000.00 Danish Kroner
Project

Relationships between room acoustic data and concert hall design
The purpose of this project is to improve the general knowledge about how size, shape and other geometric design variables influence the acoustic conditions of assembly halls like concert halls, theatres, multipurpose halls, churches etc. This year, renewed analysis of a data base (now containing more than 50 halls) has been carried out. The results obtained so far have confirmed most of the earlier results but have also revealed new relationships. Thus, it has now been possible to find some of the geometrical factors governing the rate of attenuation in sound level with distance from the stage.

Department of Acoustic Technology
Period: 01/05/1992 → …
Number of participants: 2
Project participant:
Rasmussen, Jørgen (Intern)
Project Manager, organisational:
Gade, Anders Christian (Intern)
Project

Acoustics and geometries of concert halls
This investigation attempts to reveal general relationships between room geometry and the acoustic properties in concert halls through statistical analysis of the data available in our existing data base. The examined objective acoustic parameters for audience are EDT, ts, LEF, C, G, G(r) (Rate of Spatial Decay [dB/10 m]), and for musicians, EDTP (EDT measured on the podium) and ST1. The acoustic parameters are averaged over frequency and position before the analyses. This year correlation analysis, principal component analysis and multible linear regression analysis have been carried out in order to see if these methods were able to reveal further information on the interaction between room geometry and acoustic properties. Besides, new geometrical parameters were included in the analyses; some were taken from newer literature and some were developed within the project. Also, two general and flexible room models were made in the simulation program ODEON, one rectangular model and one fanshaped model, in which single geometrical parameters were varied in an attempt to verify the regression models. For the acoustic parameters the correlation analysis showed that often many of the geometrical parameters had a good correlation with the acoustic parameters or with the difference between the parameter and its expected value according to diffuse field theory. Furthermore, the principal component analysis revealed complicated interactions among the geometrical parameters. From the simulations in ODEON it was generally found that the altered geometrical parameter showed the same effect on a current acoustic parameters as found from the regression models. The similarity between the ODEON calculations and the regression models was more distinct for acoustic parameters not related to reverberation time (ie parameters for which no value can be predicted via diffuse field theory).

Department of Acoustic Technology
Department of Electrical Engineering
Period: 01/01/1992 → …
Number of participants: 2
Project participant:
Weitze, Christoffer Andreas (Intern)
Project Manager, organisational:
Gade, Anders Christian (Intern)
Project

Assessment of hearing protector performance in impulse noise, IMPRO
The IMPRO project is a European project coordinated by TNO, Soesterberg, The Netherlands. The measurements at the different participating laboratories are finalised. The last meeting in the IMPRO project took place in March 1996 at DTU where a draft Final Report was discussed. The final report was published (by TNO) November 1996.

Department of Acoustic Technology
Berufsgenossenschaftliches Institut für Arbeitssicherheit
Finnish Institute of Occupational Health
Institut National de Recherche et de Sécurité
Institut Franco-Allemand de Recherches de Saint-Louis
Karolinska Institutet
Physikalisch-Technische Bundesanstalt
TNO Human Factors Research Institute, Soesterberg
University of Salford
Period: 01/01/1992 → 01/11/1996
Number of participants: 1
Project Manager, organisational: Poulsen, Torben (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 327,000.00 Danish Kroner

Danish Primary Laboratory on Acoustics
The Danish Primary Laboratory on Acoustics, DPLA, was established in 1991 by the Ministry of Industry. The laboratory is based on a cooperation agreement between the Department of Acoustic Technology, DTU, and the company Brüel & Kjær A/S. The Danish Primary Laboratory on Acoustics is accredited by the Danish Accreditation Body for Testing Laboratories, DANAK, to carry out primary calibration of microphones and accelerometers. The development of new software for free-field reciprocity calibration of microphones was nearly finished by the end of 1997. The measurement system makes it possible to carry out automated calibrations in a wide frequency range (from 630 Hz to 100 kHz) and for measurement distances in the range from 200 to 800 mm between the microphones, variable in steps of 0.1 mm. An automatic measurement system has been developed for the calibration of pistonphones. DANAK has appointed the Danish Primary Laboratory on Acoustics to organise an intercomparison on the calibration of pistonphones and sound calibrators among accredited laboratories under the auspices of EA, European cooperation for Accreditation. The intercomparison was conducted in 1998/1999 and the final report issued in December 1999.

Department of Acoustic Technology

Variable acoustics by means of electronics
The work focuses on investigating the possibilities and limitations of electronic reverberation enhancement systems. The natural acoustic conditions will limit the degree of realism of the intended acoustic variations, particularly when such systems are installed in small halls. This year an experimental system was built in one of the auditoria at DTU in order to create a large set of stimuli for subjective experiments for investigating the subjective effects of reflections and reverberation generated in such systems. Most of the practical work was carried out by a master thesis student, Frank Rysgaard Mortensen, who also carried out preliminary listening tests. These tests confirmed the quality of the recorded stimuli for use in future experiments.

Department of Acoustic Technology

ODEON, room acoustic calculation model
The development of the ODEON program has been continued in the year 2000. Some of the main improvements include visualisation of 3D models using OpenGL™ and a new colour code that directly relates to the frequency-dependent sound reflecting properties of the surfaces. Thus the acoustic reflectance of materials is converted directly into a visual
representation, where red represents low-frequency reflectance, green represents mid-frequency reflectance, and blue represents high-frequency reflectance. In this way totally absorbing surfaces appear as black, whereas totally reflecting surfaces are white, and the surface colours appear in a visually plausible way, making it very easy to read the acoustics properties of the surfaces in a model of a room. Angle dependent absorption has been included in point response calculations as well as in the calculation of global decays. The calculation method uses the diffuse field absorption coefficients as input, but angle dependent reflection factors taking into account the angles of incidence and sizes of surfaces are estimated. Early scattering has been included in the calculation of point responses. The calculation of early-reflected sound has been split into an image source part and a ray-tracing part allowing realistic calculation of scattered sound in early reflections. Instead of handling the early reflections as purely specular, reflections are now split into specular contributions (image sources) and ‘scattering trees’ obtained using ray tracing. This new calculation method improves results in particular when highly diffusing surfaces are present and the increase in calculation time is minimal.

Department of Acoustic Technology
Period: 01/05/1984 → …
Number of participants: 2
Project participant:
Christensen, Claus Lynge (Intern)
Project Manager, organisational:
Rindel, Jens Holger (Intern)
Project

Standardised hearing protector measurements
Standards and test methods in relation to sound attenuation of hearing protectors are evaluated. The sound field requirements in ISO 4869-1 are erroneous and misleading and possible new formulations of the requirements are under development. Comparisons are made of measurements carried out according to ISO and ANSI methods. T. Poulsen serve as chairman for the ISO working group responsible for standardized hearing protector test methods. A paper has been published by Acustica united with Acta Acustica, vol 85, 1999.

Department of Acoustic Technology
Period: 01/09/1978 → …
Number of participants: 1
Project Manager, organisational:
Poulsen, Torben (Intern)
Project