Evaluating the auralization of a small room in a virtual sound environment using objective room acoustic measures

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Room Acoustic Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Reference Room</th>
<th>Room Acoustic Model</th>
<th>Virtual Sound Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity (C80; mean±standard deviation) over octave bands</td>
<td>0.95±0.05</td>
<td>0.93±0.04</td>
<td>0.92±0.03</td>
</tr>
<tr>
<td>Energy decay measures</td>
<td>0.12±0.02</td>
<td>0.13±0.02</td>
<td>0.14±0.03</td>
</tr>
<tr>
<td>Early-to-late ratio (C7)</td>
<td>0.58±0.12</td>
<td>0.60±0.13</td>
<td>0.62±0.15</td>
</tr>
</tbody>
</table>

Binaural Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Reference Room</th>
<th>Room Acoustic Model</th>
<th>Virtual Sound Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IACC</td>
<td>0.85±0.05</td>
<td>0.84±0.04</td>
<td>0.83±0.03</td>
</tr>
<tr>
<td>RANE</td>
<td>0.20±0.05</td>
<td>0.21±0.05</td>
<td>0.22±0.06</td>
</tr>
</tbody>
</table>

Conclusions

- Long-term, averaged measures are reproduced in the range of ~1 JND (T20/30, C50/80, STI, IACC)
- Short-term features of the impulse response are more difficult to capture leading to higher errors in e.g. EDT and CT
- Similar performances were obtained across reproduction techniques
- Auralization errors (auralization vs. model) are in the range of modelling errors (model vs reference)
- Dynamic binaural cues appear to be well captured
- Perceptual differences (e.g. speech intelligibility) occur, but not reflected in shown objective measures

Further investigations needed to link perceptual differences to objective measures

Literature


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