Radiation impedance of condenser microphones and their diffuse-field responses.

Radiation impedance of condenser microphones and their diffuse-field responses.
The relation between the diffuse-field response and the radiation impedance of a microphone has been investigated. Such a relation can be derived from classical theory. The practical measurement of the radiation impedance requires (a) measuring the volume velocity of the membrane of the microphone and (b) measuring the pressure on the membrane of the microphone. The first measurement is carried out by means of laser vibrometry. The second measurement cannot be implemented in practice. However, the pressure on the membrane can be calculated numerically by means of the boundary element method. In this way, a hybrid estimate of the radiation impedance is obtained. The resulting estimate of the diffuse-field response is compared with experimental estimates of the diffuse-field response determined using reciprocity and the random-incidence method. The different estimates are in good agreement at frequencies below the resonance frequency of the microphone. Although the method may not be of great practical utility, it provides a useful validation of the estimates obtained by other means.

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