

AES information document for room acoustics and sound reinforcement systems – Characterization and measurement of surface scattering uniformity

Published by

Audio Engineering Society, Inc.

Copyright ©2001 by the Audio Engineering Society

Abstract

This document provides guidelines for characterizing the uniformity of scattering produced by surfaces from measurements or predictions of scattered polar responses.

An AES standard implies a consensus of those directly and materially affected by its scope and provisions and is intended as a guide to aid the manufacturer, the consumer, and the general public. An AES information document is a form of standard containing a summary of scientific and technical information; originated by a technically competent writing group; important to the preparation and justification of an AES standard or to the understanding and application of such information to a specific technical subject. An AES information document implies the same consensus as an AES standard. However, dissenting comments, if any, may be published with the document.

The existence of an AES standard or AES information document does not in any respect preclude anyone, whether or not he or she has approved the document, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. Attention is drawn to the possibility that some of the elements of this AES standard or information document may be the subject of patent rights. AES shall not be held responsible for identifying any or all such patents.

This document is subject to periodic review and users are cautioned to obtain the latest edition and printing.

Document preview:
for full document, go to
www.aes.org/publications/standards

Contents

Foreword	3
1 Scope	4
2 Normative references	4
3 Definitions	4
4 Measurement of polar response.....	7
4.1 Measurement environment.....	7
4.2 Measurement field.....	9
4.3 Test sample	11
4.4 Measuring techniques.....	11
4.5 Polar response processing.....	13
5 Prediction techniques.....	16
6 Extraction of coefficients.....	16
6.1 Directional diffusion coefficient	16
6.2 Calculation of area factors.....	17
6.3 Diffusion coefficient.....	18
7 Presentation of results	18
8 Test report.....	18
Annex A Qualification of a measurement space.....	19
A.1 Space criteria.....	19
A.1.1 Sound pressure level deviation.....	19
A.1.2 Signal-to-noise ratio.....	19
A.2 Environments.....	19
A.2.1 Anechoic chamber.....	19
A.2.2 Non-anechoic space.....	19
A.2.3 Placement	19
Annex B Informative references.....	20

Foreword

[This foreword is not a part of *AES information document for room acoustics and sound reinforcement systems— Characterization and measurement of surface scattering uniformity*, AES-4id-2001.]

This document was prepared by a writing group of the SC-04-02 Working Group on Characterization of Acoustical Materials of the SC-04 Subcommittee on Acoustics in partial fulfillment of project AES-X06, Measuring and Modeling Acoustical Materials: Specification of Measuring Methods, Computer Models, and Transportable Computer Data Files Compatible with Room Simulators and Auralizers. The project was initiated in 1994.

Trevor Cox headed the writing group for the final draft in cooperation with the International Organization for Standardization (ISO) TC 43 SC 2 Building Acoustics working group (WG25) under AES project AES-X81.

Peter D'Antonio, chair
Trevor Cox, vice-chair
SC-04-02
2000-09-07

Document preview:
for full document, go to
www.aes.org/publications/standards

AES information document for room acoustics and sound reinforcement systems – Characterization and measurement of surface scattering uniformity

1 Scope

This document provides guidelines for characterizing the uniformity of scattering produced by surfaces from measurements or predictions of scattered polar responses. In this context, the surface scattering is quantified in terms of a single diffusion coefficient. The diffusion coefficient is a measure of quality designed to be used by producers and users of surfaces that, either deliberately or accidentally, diffuse sound. It is also intended for use when needed by developers and users of geometric room acoustic models. The diffusion coefficient is not intended, however, to be blindly used as an input to current diffusion algorithms in geometric room acoustic models. The diffusion coefficient characterizes the sound reflected from a surface in terms of the uniformity of the scattered polar distribution. The information document details a free-field characterization method.

2 Normative references

No standards contain provisions that, through reference in this text, constitute provisions of this document.

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

reference flat surface

plane, rigid, and thin surface, with the same projected shape or footprint as the test surface

3.2

reference normal

outward-pointing vector perpendicular to the front face of the reference flat surface

3.3

reference point

geometric center of gravity of the reference flat surface

3.4

sound ray

line following one possible direction of sound propagation from a source point

3.5

specular reflection

incident sound ray that undergoes specular reflection such that Snell's law (that is, the angle of reflection equals the angle of incidence) is obeyed, when the wavelength of sound is small compared to the dimensions of the reference flat surface

NOTE Following Fermat's principle the actual path between source and receiver via the panel will be the one that is traversed in the least time.

Document preview.
for full document, go to
www.aes.org/publications/standards