

## A Series of Studies on the Theoretical Framework and Measurement Method of Sound Field Diffusion in Architectural Spaces

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In the room acoustic design of an architectural space, controlling the “diffuseness of sound field” is one of the important factors to determine the final “quality of acoustics” in the space. A series of studies is mainly concerned with the following two topics to enable the design of the quality of acoustics in the architectural space.

1. Development of a theoretical framework for sound field diffusion;
2. Development of a method for measuring sound field diffusion.

For the first topic, the theoretical framework that connects the “scattering coefficients of walls” and “diffuseness of the sound field” was developed based on the stochastic model. As a result, it is possible to quantitatively control both the “diffusivity of the wall reflection” and the “diffusivity of the sound field,” and the unevenness of the walls can be designed scientifically and quantitatively so as to obtain a desirable acoustic effect.

For the second topic, we developed a method to quantify the variation of reflected sound energy by removing the decay in the measured impulse response. This method makes it possible to measure and quantitatively evaluate the design effect of the diffusivity of actual sound fields.