



SPATIAL AND TEMPORAL ESTIMATION OF SOUND FIELD DIFFUSENESS IN CONCERT HALLS EMPLOYING SPHERICAL MICROPHONE ARRAYS BY USING BEAMFORMING

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ABSTRACT

Sound field diffuseness has been investigated in temporal and spatial structures of room impulse responses (IRs) at different audience positions in a real and 1:10 scale model hall by using 32-channel spherical microphone array. Specular and diffusive reflections, embedded in IRs, have been identified in temporal domain. The beamforming technique is used to make directional measurements and for spatio-temporal characterization of sound field. The nature of reflections is evaluated as specular or diffusive along with the degree of diffuseness by computing “Effective Duration (τ_d)”. From the estimation of arrival direction of individual reflection, the reflective surfaces of the hall are specified as responsible for strong specular reflections. This method could provide guidance for correcting some acoustical problems (echo, focusing etc.) and for use of sound diffuser in optimal locations in concert hall and opera houses to prevent strong specular sound. It could also help out the acoustic designers in visualizing the behaviour of sound field in hall for design perspectives.