An objective measure for the sensitivity of room impulse response and its link to a diffuse sound field

This study is relevant to acoustic measurements in reverberation rooms such as measurements of sound transmission, sound absorption, and sound power levels of noise sources. The study presents a quantitative measure for the diffuseness in a room, which is first introduced theoretically and subsequently examined experimentally. The sensitivity of a room due to changes in the initial conditions is quantified by measuring a pair of impulse responses in a room differing only in the sound source position. Such changes are linked to mixing and the diffuse sound field. The measure is based on the maximum of the absolute value of the cross-correlation between the time windowed sections of the two impulse responses. By integrating this quantity normalized by the energy of the impulse response of the room, a single number rating is obtained. Results based on three sets of experiments indicate that the diffusers and absorbers in the room influence the proposed sensitivity measures systematically.