

A Round Robin on room acoustical simulation and evaluation: Results of the real- world scenarios

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ABSTRACT

Room acoustical simulation shows an increasing number of applications. There is, however, no undivided confidence in their reliability, when it comes, for example, to the design of new performance venues for music and speech. We present the results of a Round Robin, conducted to evaluate the state of the art of room acoustic modeling software both in the physical and in the perceptual realm. It was based on six acoustic scenes highlighting specific acoustic phenomena, and three complex, “real-world” spatial environments. The results of the real-world scenarios demonstrate that the tested simulation algorithms are neither able to provide a reliable pattern of early reflections, nor do they provide a reliable prediction of room acoustic parameters outside a medium frequency range. In the perceptual domain, the algorithms under test could generate mostly plausible but not authentic auralizations, i.e., the difference between simulated and measured impulse responses of the same scene was always clearly audible. This perceptual difference can be traced back to the simplified modeling of absorption and scattering, and to shortcomings in the simulation of early reflections due to the missing or insufficient modeling of diffraction.

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