Volumetric sampling of the sound field in a room

Compact transducer arrays are suitable for source localization problems or directional analysis of room impulse responses from specific locations. However, a spatial distribution of the measurements can be more convenient if the goal is to reconstruct the sound field within large part of a room’s volume. In this study, we examine effective strategies for sampling the acoustic field inside the volume of a room. Favorable spatial sampling schemes within the room are determined based on numerical analysis. Additionally, the use of particle velocity information is investigated; specifically, measurements of particle velocity are added to the sensing matrix, and prior information on the room’s boundaries normal velocity is incorporated. The results indicate that the use of favorable spatial sampling schemes combined with velocity information results on a quantitative improvement of the volumetric sound field reconstruction.