Experimental and numerical comparison of absorption optimization in small rooms

A vast majority of modern music is recorded and produced in small control room environments of volumes of around 50 m3. Several problems occur when controlling the room acoustics of such small spaces. First, the room modes will produce strong peaks and dips particularly at lower frequencies, and even in the sweet spot position the listening experience can be easily deteriorated. Second, when designing or refurbishing small rooms it is hard to adequately predict the reverberation time by using Sabine’s formula due to highly non-diffuse conditions and using a statistical approach below the Schroeder frequency. This project investigates experimentally changes in the room acoustic parameters by altering the positioning and orientation of porous materials in a small room, which are compared with finite element method (FEM) simulations. FEM is able to take into account the exact room geometry, boundary conditions, and phase information providing accuracy at low frequencies. Good agreements are found between measurements and simulations, confirming that FEM can be used as a design tool for optimizing absorption and acoustic parameters in small rooms.