

## **ACOUSTICS2008/473**

### **Different approaches for efficient finite element modelling of absorbers in small rooms**

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The FEM is a powerful tool for the numerical simulation of sound fields in enclosures. It accounts for the modal characteristics of the sound field, which are dominant at frequencies below the Schroeder frequency and it is also possible to model the mutual coupling between airborne and structure borne sound fields, when an appropriate structure model is implemented.

When applying the FEM to complex room acoustics applications, like e.g. a control room in a recording studio, it is a challenging task to specify realistic boundary conditions. Different kinds of acoustical absorbers like Helmholtz resonators, plate absorbers and complex layered porous absorbers are found in these environments. While it is possible in principle to use complex and exhaustive models for these acoustical absorbers, it is often computationally much more efficient to use acoustic impedances or two-port network FEM elements to represent the fluid structure interactions.

In the course of this study we compare different approaches for the modelling of Helmholtz resonators (without and without flow resistance), since it has proven very costly in terms of computation time to explicitly model every single hole in the resonator boxes. The simulation results are compared with results measured in a model room.