

**ANALYSIS OF SOUND PROPAGATION IN AN 8TH
SCALED COUPLED VOLUME SYSTEM**

By

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Abstract

The aim of this research is to develop a method which can be used to analyze low frequency and mid frequency sound propagation in a coupled volume system. The method was developed and used to analyze sound propagation in an 8th scaled coupled volume system for different aperture geometries. The cross sectional area of the primary room and the secondary room were scanned over high spatial resolution grids using an automated scanning system for 2 aperture geometries. The frequency range of interest was from 63 Hz to 1000 Hz (scaled). The coupled volume system is fitted with custom made diffuse panels and absorbing foam. A dedicated analysis algorithm was developed which converts the experimentally measured room impulse response data at each grid point into energy distributions and instantaneous sound pressure levels as a function of time. The analysis algorithm provides streams of data for a selected frequency, thereby creating an animation of sound propagating through the coupled volume system. It has the advantage of using experimentally measured data instead of simulation based methods thereby providing a far more accurate and intuitive way of analyzing sound propagation in acoustical spaces. This work demonstrates wave phenomena for different aperture configurations at low frequencies and mid frequencies by using animations to analyze the experimentally measured data.