The Method of Fundamental Solutions Used to Simulate Sound Wave Propagation Inside a Sound Absorbent Enclosed Space

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The method of fundamental solutions (MFS) is formulated in the frequency domain to model the wave field generated by a pressure source in an enclosed space (a room). In this formulation the solution is approximated by a linear combination of fundamental solutions generated by virtual sources placed outside the domain in order to avoid singularities The fundamental solutions applied in the present model can simulate acoustic domains such as fluid layers or fluid wedges and are established by using the image source approach. The use of these solutions avoids the placement of collocation points on the horizontal and inclined surfaces and the MFS is only used to couple those acoustic domains along vertical surfaces. Sound absorption can be ascribed to some surfaces by imposing an impedance boundary condition. Results in the time domain are obtained by applying an inverse Fourier transform assuming a source to be modeled as a Ricker wavelet.

Keywords: Method of Fundamental Solutions, Image source technique, Sound wave propagation.