Title: Application of the PUFEM for the 2D analysis of interior sound field with absorbing materials

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Abstract

The paper deals with the numerical simulation of the acoustic field in two dimensional cavities in which absorbing materials are present. Though Finite Element Method (FEM) could be employed for this purpose, the discretization level required for achieving reasonable accuracy renders the method impractical in the mid-frequency range.To alleviate this limitation, the Partition of Unity Finite Element Method (PUFEM) using plane wave functions has been shown to be very effective for solving short waves Helmholtz problems.

In the present work, the method is extended for the computation of the pressure wave field within the absorbing media which is modeled as a bulk-reacting material characterized by a complex mean density and a complex speed of sound. Lagrange multipliers are used to enforce the transmission conditions at the air-material interface. Performances of the PUFEM are compared with standard FEM in several examples of practical interests.
It is shown that the technique is a good candidate for solving noise control problems of large dimensions.