Evolutionary topology optimization for acoustic-structure interaction problems using a mixed u/p formulation

In this work, we present a topology optimization method for acoustic-structure interaction problems, which combines bi-directional evolutionary structural optimization (BESO) with a mixed displacement-pressure (u/p) formulation as an effective and straightforward design method for a multiphysics system involving acoustic-structure interactions. Due to the binary characteristics of the BESO and the multi-physics modeling approach of the mixed formulation, the proposed optimization procedure could benefit from high computational efficiency and high-quality design in acoustic-structure interaction problems. Several topology optimization problems for vibro-acoustic systems are carried out, in order to demonstrate the effectiveness of the presented method.

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