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Efficient solution of fluid-structure vibration problems. (English) Zbl 1033.74046
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Summary: This paper deals with numerical computation of elastoacoustic vibration modes. We consider a redundant description of the fluid by means of pressure and displacement potential variables. We analyze a finite element discretization leading to a well-posed symmetric banded eigenvalue problem. An iterative algorithm requiring to solve sparse linear systems with one degree of freedom per fluid node is obtained. We show that, for acoustic models, this method coincides with a consistent discretization of the standard potential formulation. Numerical experiments validate the proposed methodology for elastoacoustic vibrations.

MSC:

74S05 Finite element methods applied to problems in solid mechanics
74F10 Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)

Cited in 4 Documents

Keywords:

pressure-potential formulation; shift-and-invert eigensolver; elastoacoustic vibration modes; finite element discretization; well-posed symmetric banded eigenvalue problem; iterative algorithm; sparse linear systems

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