

DIVERGENCE-FREE FINITE ELEMENTS FOR THE NUMERICAL SOLUTION OF A HYDROELASTIC VIBRATION PROBLEM

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ABSTRACT. We analyze a divergence-free finite element method to solve a fluid-structure interaction problem in the three-dimensional case. The main unknowns of the resulting formulation are the displacements for the fluid and the solid. The pressure of the fluid on the interface separating the fluid and the solid is taken as a Lagrange multiplier to couple both media [1,2]. The resulting mixed eigenvalue problem is approximated by using appropriate bases of the divergence-free lowest order Raviart-Thomas finite elements for the fluid [3,4], piecewise linear elements for the solid and piecewise constant elements for the pressure. It is proved that eigenvalues and eigenfunctions are efficiently approximated and numerical experiments are presented in order to assess the performance of the method.

Keywords: Fluid-structure, spectral problems, divergence-free finite elements.

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