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# A fully discrete scheme for the pressure-stress formulation of a time-domain fluid-structure interaction problem*

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**Abstract**

We propose an implicit Newmark method for the time integration of the pressure-stress formulation of a fluid-structure interaction problem. The space Galerkin discretization is based on the Arnold-Falk-Winther mixed finite element method with weak symmetry in the solid and the usual Lagrange finite element method in the acoustic medium. We prove that the resulting fully discrete scheme is well-posed and uniformly stable with respect to the discretization parameters and Poisson ratio, and we provide asymptotic error estimates. Finally, we present numerical tests to confirm the asymptotic error estimates predicted by the theory.

**Key words**: mixed finite elements, fluid-solid interaction, error estimates

**Mathematics subject classifications (1991)**: 65N30, 65M12, 65M15, 74H15

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