A LAGRANGE MULTIPLIER METHOD FOR FLUID-STRUCTURE INTERACTIONS

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Abstract. In this talk I present some recent advances on the discretization of fluid-structure interaction problems based on the Lagrange multiplier formulation presented in [1]. The problem fits in the framework of saddle point systems, so that possible choices of the finite element spaces have been investigated in [2].

Our formulation allows for solving the Navier-Stokes equation and the elasticity equation on meshes independent of each other, at the price of computing a coupling term which involves test funtions defined on both meshes. A discussion on how to deal carefully with such term will also be presented [3].

References

[1] D. Boffi and L. Gastaldi, *A fictitious domain approach with Lagrange multiplier for fluid-structure interactions*, Numer. Math. **135** (2017), 711-732

[2] N. Alshehri, D. Boffi, and L. Gastaldi, *New unfitted mixed finite element methods for elliptic interface problems*, Numerical Methods for Partial Differential Equations. (2023) doi:10.1002/num.23063. Article in press.

[3] D. Boffi, F. Credali, and L. Gastaldi, *On the interface matrix for fluid-structure interaction problems with fictitious domain approach*, Computer Methods in Applied Mechanics and Engineering **401** (2022) doi:10.1016/j.cma.2022.115650.

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