

CONVERGENCE ANALYSIS OF THE FINITE ELEMENT IMMERSED BOUNDARY METHOD WITH DISTRIBUTED LAGRANGE MULTIPLIER

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In this talk we consider the finite element discretization of the Immersed Boundary Method (IBM) introduced by Peskin [6] for fluid-structure interaction problems. With respect to the original finite differences discretization the finite element approach can take advantage from the variational formulation in handling the Dirac delta function which takes into account the presence of the structure [4, 3, 5, 1]. More recently we have introduced a totally variational formulation based on the introduction of a distributed Lagrange multiplier associated to the constraint which takes into account the continuity of the fluid and the structure velocity. We proved that the discretization based on a semi-implicit Euler scheme is unconditionally stable both for the continuous problem and for its finite element discretization [2]. After time discretization we are lead to analyze a saddle point problem. We study the finite element discretization of this problem and report the results obtained in collaboration with Daniele Boffi and Nicola Cavallini.

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