

Convergence of the Lagrange-Galerkin method for a fluid-rigid system with discontinuous density

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Abstract

We focus on a new characteristics method for the discretization of the equations modelling the motion of the two dimensional rigid body immersed in an incompressible viscous fluid, in the case where the densities of the fluid and the solid are different. The method is based on a global weak formulation involving only terms defined on the whole fluid-rigid domain. To take into account the non-linear term in the Navier-Stokes equations, we construct a special characteristic function which exactly maps the approximate rigid body at the $(k + 1)$ -th discrete time level into the approximate rigid body at time t_k . The details of the convergence proofs are completely given for both semi-discrete and fully-discrete schemes in the paper J. San Martín, J.-F. Scheid, L. Smaranda, *A modified Lagrange-Galerkin method for a fluid-rigid system with discontinuous density*, Numerische Mathematik, 2012, DOI: 10.1007/s00211-012-0460-1.

AMS Classification: Primary 35Q30; Secondary 65M12.