On the problem of the motion of a rigid body in a compressible fluid

Šárka Nečasová, Arnab Roy
Institute of Mathematics, Czech Academy of Sciences (Czech Republic)

Mythily Ramaswamy
NASI Senior Scientist, ICTS-TIFR (India)

Anja Schlömerkemper
Institute of Mathematics, University of Würzburg (Germany)

`matus@math.cas.cz`

Abstract

We study a 3D nonlinear moving boundary fluid-structure interaction problem describing the interaction of the fluid flow with a rigid body. The fluid flow is governed by 3D compressible Navier-Stokes equations, while the motion of the rigid body is described by a system of ordinary differential equations called Euler equations for the rigid body. The equations are fully coupled via dynamical and kinematic coupling conditions. We consider the Navier-slip boundary condition at the interface as well as at the boundary of the domain and we show existence of a weak solution of the fluid-structure system up to collision.