
Existence of a weak solution to a fluid-elastic structure interaction problem with the slip boundary condition

Boris Muha^{*1} and Suncica Canic²

¹Department of Mathematics, Faculty of Science, University of Zagreb (PMF-MO, UniZg) – Bijenicka Cesta 30, 10000 Zagreb, Croatia

²Department of Mathematics, University of Houston (UH) – 4800 Calhoun St Houston Tx 77204-3008, United States

Abstract

We study a nonlinear, moving boundary fluid-structure interaction problem between the $2D$ Newtonian fluid and $1D$ elastic structure of a shell/plate type. The structure and the fluid velocities are coupled via the Navier's slip boundary condition. The slip boundary condition is more realistic than the classical no-slip boundary condition in some realistic situations, for example in describing the dynamics near a contact, or describing the multi-layered blood vessel. We prove existence of a weak solution in a quite general setting. The proof is constructive and we propose the corresponding convergent numerical scheme for solving the problem.

^{*}Speaker