

Effective equation modeling the unsteady interaction of fluid flow in a thin channel with an elastic plate

Talk

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(joint work with Eduard Marušić-Paloka)

We consider a viscous incompressible fluid interaction with an elastic plate located on one part of the fluid boundary. The flow is governed by Stokes equation and a given time-dependent pressure drop between the inlet and the outlet boundary. Due to the small displacement of the structure, we neglect the deformation of the fluid domain. We obtain the existence of at least one weak solution for the problem. We study the dynamics of this coupled fluid-structure system in the limit when the ratio of the thickness of the fluid layer to its length tends to zero. We obtain a set of effective equations. The approximation is rigorously justified through a weak convergence result. We prove results on uniqueness and regularity of solution of the effective equations.

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