On the analysis and numerical solving of a fluid-structure toy problem.

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Fluid–structure interaction problems arise in many fields, for instance in physiological flows such as airflow in deformable bronchi or blood flow in arteries. In this work, we consider a simplified "toy" fluid–structure interaction problem. We study the flow of an incompressible, viscous, Newtonian, and homogeneous fluid, described by the Stokes equations, in a domain where one wall is mobile. The motion of this wall is governed by a spring and by the hydrodynamic force exerted by the fluid.

The aim of this work is to present the modeling of this problem, as well as some theoretical results (equilibrium position, stability, invariance, well-posedness, etc.) and numerical results (discretization methods, simulations, etc.). The existence of a weak solution to this model has been established using an approach introduced in [1] and further developed in [2].

We also discuss several open questions and possible directions for future research.

[1] B. Muha, S. Canić. *Existence of a weak solution to a nonlinear fluid–structure interaction problem modeling the flow of an incompressible, viscous fluid in a cylinder with deformable walls.* Archive for rational mechanics and analysis, **207(3)**, 919–968, 2013.

[2] B. Muha, S. Čanić. *Existence of a solution to a fluid–multi-layered-structure interaction problem.* Journal of Differential Equations, **256(2)**, 658–706, 2014.

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