

**Bayada, G.; Chambat, M.; Cid, B.; Vázquez, C.**

**On the existence of solution for a nonhomogeneous Stokes-rod coupled problem.** (English)

Zbl 1086.74013

Nonlinear Anal., Theory Methods Appl., Ser. A, Theory Methods 59, No. 1-2, 1-19 (2004).

Summary: The existence of solution for a stationary fluid-structure interaction problem is stated. More precisely, the viscous incompressible fluid is governed by Stokes equations with nonhomogeneous Dirichlet boundary conditions on the velocity. The elastic structure occupies the upper boundary of the fluid domain and is governed by a rod model. The coupling is given by the fluid pressure acting as an external force on the rod and the rod displacement modifying the initial fluid domain. After passing to homogeneous boundary conditions by lifting and Lagrangian coordinates for Stokes equations, the existence of solution in appropriate functional spaces follows from a fixed point iteration between both models. Norm estimates and regularity of the solution of each model are essential to apply the fixed point theorem. In this way, the technique also provides estimates for rod displacement, fluid pressure and velocity.

**MSC:**

- 74F10 Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)
- 74G25 Global existence of solutions for equilibrium problems in solid mechanics (MSC2010)
- 74K10 Rods (beams, columns, shafts, arches, rings, etc.)
- 76D07 Stokes and related (Oseen, etc.) flows

Cited in 5 Documents

**Keywords:**

fluid-structure interaction; regularity; fixed point theorem

**Full Text:** [DOI](#)

**References:**

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