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**Time-varying creeping flow in an elastic shell enveloping a slender rigid center-body**[1] SHAI ELBAZ, AMIR GAT, Technion - Israel Institute of Technology — Flows in contact with elastic structures apply stress at the fluid-solid interface and thus create deformation fields in the solid. We study the time-varying interaction between elastic structures, subject to external forces, and an internal viscous liquid. We neglect inertia in the liquid and solid and focus on axi-symmetric annular flow enclosed by a thin-walled slender elastic shell and internally bounded by a variable cross-section rigid center-body. We employ elastic shell theory and the lubrication approximation to show that the problem is governed by the forced porous medium equation with regard to fluid pressure. We present several solutions of the flow-field and solid-deformation for various time-varying inlet pressure and external forces. The presented interaction between viscosity and elasticity may be applied to fields such as soft-robotics and micro-swimmers.

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