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Model of a Soft Robotic Actuator with Embedded Fluidic Network BENNY GAMUS, YIZHAR OR, AMIR GAT, Technion - Israel Institute of Technology — Soft robotics is an emerging bio-inspired concept of actuation, with promising applications for robotic locomotion and manipulation. Focusing on actuation by pressurized embedded fluidic networks, we present analytic formulation and closed-form solutions of an elastic actuator with pressurized fluidic networks. In this work we account for the effects of solid inertia and elasticity, as well as fluid viscosity, which allows modelling the system's step-response and frequency response as well as suggesting mode elimination and isolation techniques. We also present and model the application of viscous-peeling as an actuation mechanism, simplifying the fabrication process by eliminating the need for internal cavities. The theoretical results describing the viscous-elastic-inertial dynamics of the actuator are illustrated by experiments. The approach presented in this work may pave the way for the design and implementation of soft robotic legged locomotion that exploits dynamic effects.

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