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Dynamics of Active Microfilaments FENG LING, HANLIANG GUO, EVA KANSO, Univ of Southern California — Soft elastic filaments are ubiquitous in natural and artificial systems at various length scales, and their interactions within and between filaments and their environments provide a persistent source of curiosity due to both the complexity of their behaviors and the relative mathematical simplicity of their structures. Specifically, a deeper understanding of the dynamic characteristics of microscopic filaments in viscous fluids is relevant to many biophysical and physiological processes. Here we start with the Cosserat model that allows all six possible modes of deformation for an elastic rod, and focus on the case of inextensible filaments submerged in viscous fluids by ignoring inertial effects and using local resistive force theory for fluid-filament interactions. We verify our simulations against special analytic solutions and present some results on the active internal control of cilia and flagella motion. We conclude by commenting on the utility of this general framework for studying other cellular and sub-cellular physical processes such as systems involving protein filaments.

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