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Simulations of elastic, stretchable, shearable curves interacting with a liquid MATTIA GAZZOLA, Harvard University, ANDREW MCCORMICK, Google, L MAHADEVAN, Harvard University — We present a general numerical approach for the simulations of soft filaments deforming in three-dimensional space. Unlike the vast literature on inextensible and unshearable rods, we enable all possible deformation modes at every cross-section consistent with the full Euclidean group SE(3), namely, bending, twisting, shear and stretch. Additionally, we also allow elastic curves to interact with the environment via muscular activity, self-contact, surface friction and hydrodynamics. We demonstrate the capabilities of our approach on a range of biophysical problems, with an emphasis on limbless locomotion on dry surfaces, thin liquid films and in bulk liquids.

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