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Two-Point Particle Tracking Microrheology of Nematic Complex Fluids MANUEL GOMEZ-GONZALEZ, JUAN C. DEL ALAMO, University of California, San Diego — Many biological and technological complex fluids exhibit tight microstructural alignment that confers them nematic mechanical properties. However, current microrheological methods are unable to characterize the rheological response of nematic complex fluids along different directions. In this talk, we present a novel directional two-point particle-tracking microrheology method (D2PTM) that allows to measure the viscoelasticity of nematic complex fluids. We establish the theoretical foundation for D2PTM by analyzing the motion of a probing microscopic particle embedded in a nematic complex fluid, and the mutual hydrodynamic interactions between pairs of distant particles. From this analysis, we generalize the formulation of two-point particle tracking microrheology for nematic complex fluids. We test the new D2PTM formulation by simulating the motion of groups of particles undergoing Brownian motion in a nematic complex fluid with prescribed directional shear moduli. Lastly, we illustrate the experimental application of the new technique by measuring nematic F-actin solutions. These experiments constitute the first microrheological measurement of shear moduli in an anisotropic soft material.

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