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2-Point Particle Tracking Microrheology of Directional Gels
MANUEL GOMEZ-GONZALEZ, JUAN C. DEL ALAMO, University of California, San Diego — The stiffness of the cell cytoplasm, and other minute-quantity materials, can be measured by using Particle Tracking Microrheology, where a micron size spherical particle is used as a probe. It relies on the assumption of isotropy of the probed material. In order to apply it to highly oriented materials we have calculated the drag force of a microparticle embedded in a directional viscoelastic gel. The gel is modeled as a directional viscoelastic network frictionally coupled to a viscous isotropic fluid. The directional network is modeled with the Leslie-Ericksen equations and the isotropic fluid with the Stokes equation. The motion of particles embedded in such a directional gel is dependent on up to three viscoelastic coefficients, but only two can be calculated from tracking a single probing particle. We have calculated the first order perturbation that the motion of one probe induces on a distant particle, as a function of the three viscosity coefficients. By correlating the motion of two distant particles we can measure such a perturbation and obtain three independent equations that univocally determine the three viscoelasticity coefficients that define a directional viscoelastic gel.

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