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2-Point Particle Tracking Microrheology of Directional Viscoelastic Gels MANUEL GOMEZ-GONZALEZ, JUAN C. DEL ALAMO, University of California, San Diego — By applying Particle Tracking Microrheology we can measure the stiffness of the cell cytoplasm, using a spherical microparticle as a probe. PTM relies on the assumption of isotropy, but this hypothesis breaks for highly oriented materials. In order to apply PTM to them, we have calculated the drag force of a particle embedded in a directional viscoelastic gel, 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 fluid with the Stokes equation. The motion of particles embedded in such a directional gel is dependent on up to three viscoelasticity 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 viscoelasticity 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. We show the accuracy of the Directional 2-Point PTM by applying it to a control numerical experiment, and finally we apply it to an essential biological sample such as nematic F-actin.

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