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Dynamics of a microsphere in an anisotropic gel: a frontier in intracellular microrheology[1] MANUEL GOMEZ-GONZALEZ, JUAN CARLOS DEL ALAMO, MAE Department, UC SanDiego — Particle tracking microrheology (PTM) is widely used to calculate the shear modulus of complex fluids. This technique is specially suitable to characterize the cell cytoplasm but its current formulation assumes isotropy, thereby rendering averaged shear moduli that are affected by the motion of the probe and do not represent accurately the inherent properties of the medium. This leads to errors greater than 100% when isotropic PTM is applied to live cells. In this work, we modify the PTM formulation to obtain the Directional Shear Moduli of an orthotropic medium. We study the motion of a spherical particle in an orthotropic medium, described by the Leslie-Ericksen equations. We calculate the drag force exerted on the particle, in the general case of 5 independent viscosity coefficients. In the idealized case where only 2 of the viscosity coefficients are important, we obtain a closed form analytical solution that allows us to modify current PTM formulae and obtain the directional shear moduli from the random thermal motion of a particle embedded in the cell cytoplasm.

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