



FRONTIERS IN MICRORHEOLOGY



Title(2): Response function of a sphere in the two-fluid model for a gel

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Abstract (2): The force felt by a sphere in response to displacements determines the relation between the motion of a sphere under thermal or active forcing and macroscopic parameters. In the context of microrheology, this response function has been investigated using approximate approaches to the two fluid model, in which the gel is represented by a polymer network coupled to a surrounding fluid via a drag force. We present an analytic solution for the response function in the limit of small volume fraction of the polymer network and neglecting inertial effects. We use boundary conditions between the sphere and the polymer network in which the tangential stress is determined by the relative velocity; this encompasses both no-slip and free-slip boundary conditions as limits. The analytic solution yields the character and magnitude of effects arising from compressive modes of the gel, and from slip between the sphere and polymer network. Compressive modes can lead to an underestimation of moduli by up to 20%, while slip can lead to underestimation of moduli by up to 43%.



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