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Nonlocal slender body theory for active and passive particles above a wall KYLE R. STEFFEN, CHRISTEL HOHENEGGER, Univ of Utah — Active suspensions, such as collections of motile particles or swimming microorganisms, have been the subject of much research over the past decade. A recent model proposed by Saintillan and Shelley (2007, 2012) models the motion of particles in free space using a local slender body theory, where the motile force is due to an imposed shear stress at the particle surface and the dynamics of the slender particle is approximated by relating its velocity to the force along its centerline. Because interactions between suspended particles and a fixed wall are inherently nonlocal, the local drag model is not enough. Motivated by the work of Tornberg et al. (2004, 2006) and Götz (2006), we present a nonlocal slender body theory for a slender body above a stationary planar boundary. We consider both the case of a rigid fiber and of a motile swimmer including an active shear stress. Simulating the resulting dynamics of multiple particles requires the solution of a system of coupled integral equations for the force density. As opposed to the case of a straight fiber in free space, the resulting system is not diagonalizable using Legendre polynomials. We consider direct simulations of a small number of particles.

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