Abstract Submitted
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Hydrodynamic Forces in the Lubrication Regime: A Molecular Dynamics Study[1] SIVAKUMAR R. CHALLA, MILENA USABIAGA ZABALETA, MARC INGBER, University of New Mexico, FRANK VAN SWOL, Sandia National Laboratories — We report on classical molecular dynamics simulations of large spheres moving toward a flat substrate and large spheres moving toward each other. The simulations are designed to investigate hydrodynamics at the molecular scale. We show a new decomposition approach appropriate for force microscopy measurements, and extract the static and dynamic components of the total force from approaching- and receding-force curves that are obtained from simulations or experiments. The dynamic force is evaluated for a range of sphere sizes and approach velocities, with different fluids and as well as with different surface characteristics - smoothness, roughness, and compliance. A comparison with hydrodynamic predictions for the dynamic force is made for these various cases.

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