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A modified kinetic theory for frictional granular flows in dense and dilute regimes SEBASTIAN CHIALVO, SANKARAN SUNDARESAN, Department of Chemical and Biological Enginering, Princeton University — We investigate the rheology of granular materials in both the dense and dilute inertial regimes via molecular dynamics simulations of homogeneous, simple shear flows of soft, frictional spheres. Though traditional kinetic theories are often used for continuum modeling of such materials, they fail to describe flow behavior in dense systems near the jamming transition and do not account explicitly for interparticle friction. On the basis of our simulations, we propose a new model for the radial distribution function at contact as well as modifications to the shear stress and energy dissipation equations of one commonly used theory [1]. These changes account for stress and temperature scalings observed in our steady shear simulations while preserving the dynamic nature of the kinetic theory model.

[1] V. Garzó and J.W. Dufty, Phys. Rev. E 59, 5895 (1999).

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