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A continuum model with microstructural evolution for Stokesian suspensions, viscoplastic dispersions and granular media JOE GODDARD, University of California, San Diego — A special case of the "thixotropic" fluid proposed several years ago by this author (*J. NonNewtonian Fluid Mech.* **14** 141-160,1984) is explored as a plausible model for the flow of homogeneous particle suspensions and dense granular media. The effect of deformation history is described by the shear-induced evolution of a second-rank "fabric" tensor, which serves to define a pair of non-negative fourth-rank tensors for viscosity and plasticity. The viscous model predicts qualitatively most of the time-dependent viscous shear-stress and normal-stress effects observed experimentally in Stokesian suspensions. The addition of plastic terms allows for yield stress arising from mechanical contact between particles, and the purely plastic form provides a model for quasi-static deformation of dry granular media. Addition of viscous effects to the latter provides a generalization of models currently being employed to describe dense, rapid granular flows, where the relevant microstructural time scale is associated with granular micro-inertia. A brief consideration is given to non-homogeneous (Acrivos-Leighton) models, of a type that allow for particle segregation and possibly for material instability.

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