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Yielding and vorticity banding in sheared nanotube suspensions ERIK K. HOBBIE, Department of Physics, Department of Coatings and Polymeric Materials, North Dakota State University — We analyze the yielding and flow of nanotube suspensions in the parameter space of particle concentration, aspect ratio and applied shear stress. The density of mechanical entanglements increases with both the aspect ratio and number density of nanotubes, creating an elastic particle network at very low nanotube concentration. Under simple shear flow, these networks exhibit a well-defined yield stress and classic Bingham-fluid behavior. Unstable flows at moderate Peclet number are characterized by a periodic pattern of vorticity-banded domains, which transition to a stable and homogeneous flowaligned state in the limit of very large Peclet number.

> Erik K. Hobbie NDSU

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