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Modeling the Behavior of Confined Colloidal Particles Under Shear Flow FRANCES MACKAY, COLIN DENNISTON, University of Western Ontario, MIKKO KARTTUNEN, University of Waterloo — Numerically, we investigate the behavior of systems of colloidal particles confined between two parallel walls under steady shear flow. We model these particles using molecular dynamics techniques, with hydrodynamic interactions implemented through the use of a lattice-Boltzmann fluid. Starting from an initially ordered particle arrangement, the system evolves into a variety of configurations depending on the volume fraction and shear rate used. The particles either reorder into hexagonally ordered layers aligned along the flow, form purely disordered layers, or separate into higher volume fraction, ordered layers near the walls, and lower volume fraction, disordered middle layers. We present results in the form of a phase diagram, showing the per-layer behavior as a function of volume fraction and shear rate. In addition, by tracking the positions of individual particles we show that the onset and persistence of disorder in these systems is characterized by an exchange of particles between adjacent layers.

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