Dynamics of Semiflexible Colloidal Sheets in Shear Flow[1] KEVIN
SILMORE, MICHAEL STRANO, JAMES SWAN, Massachusetts Institute of Technology MIT — As 2D materials such as graphene, transition metal dichalcogenides,
and 2D polymers become more prevalent, solution processing and colloidal-state
properties are being exploited to create advanced and functional materials. However, our understanding of the fundamental behavior of 2D colloidal sheets and
membranes in flow is still lacking. In this work, we perform Brownian dynamics
simulations of semiflexible colloidal sheets with hydrodynamic interactions in shear
flow. For athermal sheets, buckling instabilities of different mode numbers are found
to vary with bending stiffness and can be understood with simple elasticity arguments. Colloidal sheets exhibit different conformational behaviors that range from
seemingly chaotic towel-wringing to periodic tumbling as parameters such as bending stiffness and shear flow strength are varied.

Kevin Silmore
Massachusetts Institute of Technology MIT

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