COMPUTATIONAL RESEARCH
in BOSTON and BEYOND SEMINAR

BUCKLING, CRUMPLING, AND TUMBLING OF SEMIFLEXIBLE SHEETS IN SIMPLE SHEAR FLOW

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ABSTRACT:

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 sheets and membranes in fluid flow is still lacking. In this work, we perform numerical simulations of athermal semiflexible sheets with hydrodynamic interactions in shear flow. For sheets initially oriented in the flow-gradient plane, we find buckling instabilities of different mode numbers that vary with bending stiffness and can be understood with a quasi-static model of elasticity. For different initial orientations, chaotic tumbling trajectories are observed.

BIO: Kevin Silmore is a Department of Energy Computational Science Graduate Fellow and PhD Candidate in Chemical Engineering and Computation at MIT. Working with James Swan and Michael Strano, his research lies at the intersection of nanomaterials, soft matter physics, and numerical methods development. Kevin graduated with a BSE in Chemical and Biological Engineering from Princeton University in 2016.

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https://math.mit.edu/sites/crib/

ZOOM MEETING info:

https://mit.zoom.us/j/96155042770

Meeting ID: 961 5504 2770

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