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The size of the boat matters: Scale dependence in macroscopic chains thermalized by the motion of a laboratory-scale ocean KYLE WELCH, CLAYTON KILMER, ERIC CORWIN, University of Oregon — We use a bath of chaotic surface waves in water to mechanically and macroscopically mimic the thermal behavior of various microscopic systems. The chaotic waves provide isotropic and random agitation to which a temperature can be ascribed. This allows us to passively explore the degrees of freedom of a system, in analogy to thermal motion. We report on a study of 2D macroscopic chains thermalized in this fashion. We show that the behavior of short chains is fundamentally different than the behavior of long chains in both winding angle and end-to-end distance. Furthermore, we find that short chains show anomalous compressional stiffness that rapidly softens as chain length increases. We present simulational work exploring this transition from short to long, treating the chains as self-avoiding polymers. We further apply our techniques to explorations of the evolution of a system of many interacting buoyant particles, focusing on transitions from ordered to disordered states.

Kyle Welch
University of Oregon

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