

Abstract Submitted
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Inertial dynamics of chains: slack, stress, and convective instabilities JAMES HANNA, CHRISTIAN SANTANGELO, UMass-Amherst — Inertial chains may be thought of as one-dimensional incompressible/inextensible fluids or solids moving in three dimensions. Incompressibility is enforced by a stress screened by the chain's curvature (slack). The nature of the stress— tensile or compressive, uniform or spatially varying— governs the stability of the motion. The most stable motions, characterized by a uniform tensile stress, belong to a wide class that includes travelling waves of curvature and torsion. Convective instabilities exist in the presence of stress gradients; we present a striking example from a tabletop experiment involving a growing arch in a straightening chain. This work adds to a large body of literature on locally arc length preserving dynamics of curves arising in the study of thin objects such as elastic rods, vortex filaments, and oceanic jets.

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