

Abstract Submitted
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Multi-stability and bifurcations of a thin band. TIAN YU, JAMES HANNA, Department of Biomedical Engineering and Mechanics, Virginia Tech — Thin band- or strip-like structures are common motifs in flexible and deployable systems, serving as integrated connectors, hinges, and umbilicals. The morphing systems impose variable constraints on these components, inducing complex responses. We experimentally investigate a simple configuration representing the above type, a thin elastic band with end constraints on position and orientation. These constraints correspond to a combination of compression and shear with respect to a flat rectangular rest configuration. We vary the aspect ratio of the band, and the position and clamping angle at its ends. The buckled structure remains developable up to limiting deformations that approach one of two states, each dominated by two singularities. At intermediate deformations, the structure may adopt many distinct stable states. Transitions between these states can be smooth or violent, and depend strongly on constraints such as the clamping angle. Time permitting, we will relate our results to the behavior of anisotropic rods, and of strips subjected to twisting and extension.

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