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Perversions driven spontaneous symmetry breaking in heterogeneous elastic ribbons[1] SHUANGPING LIU, ZHENWEI YAO, MONICA OLVERA DE LA CRUZ, Northwestern Univ — Perversion structures in an otherwise uniform helical structure are associated with several important concepts in fundamental physics and materials science, including the spontaneous symmetry breaking and the elastic buckling. They also have strong connections with biological motifs (e.g., bacteria shapes and plant tendrils) and have potential applications in micro-muscles and soft robotics. In this work, using a three-dimensional elastomeric bi-stripe model, we investigate the properties of perversions that are independent of the specific ribbon shapes. Several intrinsic features of perversions are revealed, including the spontaneous condensation of energy as well as the distinct energy transfer modes within the perversion region. These properties of perversions associated with the storage of elastic energies can be exploited in the design of actuator devices.

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