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Buckligami: Actuation of soft structures through mechanical instabilities ARNAUD LAZARUS, PEDRO REIS, Massachusetts Institute of Technology — We present a novel mechanism for actuating soft structures, that is triggered through buckling. Our elastomeric samples are rapid-prototyped using digital fabrication and comprise of a cylindrical shell patterned with an array of voids, each of which is covered by a thin membrane. Decreasing the internal pressure of the structure induces local buckling of the ligaments of the pattern, resulting in controllable folding of the global structure. Using rigid inclusions to plug the voids in specific geometric arrangements allows us to excite a variety of different fundamental motions of the cylindrical shell, including flexure and twist. We refer to this new mechanism of buckling-induced folding as "buckligami." Given that geometry, elasticity and buckling are the underlying ingredients of this local folding mechanism, the global actuation is scalable, reversible and repeatable. Characterization and rationalization of our experiments provide crucial fundamental understanding to aid the design of new scale-independent actuators, with potential implications in the field of soft robotics.

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