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Global Curvature Buckling and Snapping of Spherical Shells.¹ MATTEO PEZZULLA, Boston University, NORBERT STOOP, Massachusetts Institute of Technology, MARK STERANKA, ABDIKHALAQ BADE, Boston University, MIGUEL TREJO, CNRS et Universit Paris-Sud, Orsay, DOUGLAS HOLMES, Boston University — A spherical shell under external pressure will eventually buckle locally through the development of a dimple. However, when a free spherical shell is subject to variations in natural curvature, it will either buckle globally or snap towards a buckled configuration. We study the similarities and differences between pressure and curvature instabilities in spherical shells. We show how the critical buckling natural curvature is largely independent of the thinness and half-angle of the shell, while the critical snapping natural curvature grows linearly with the half-angle. As a result, we demonstrate how a critical half-angle, depending only on the thinness of the shell, sets the threshold between two different kinds of snapping: as a rule of thumb, shallow shells snap into everted shells, while deep shells snap into buckled shells. As the developed models are purely geometrical, the results are applicable to a large variety of stimuli and scales.

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