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Simple experiments in thin plates: Persistence length of curvature and Snap-buckling instability YOEL FORTERRE, IUSTI, CNRS, Aix-Marseille Universite, France, CATHERINE QUILLIET, SPECTRO, CNRS, Universite Joseph-Fourier, France , L. MAHADEVAN, SEAS, Harvard University, USA, DENIS RICHARD, DAMTP, University of Cambridge, UK, LOIC TADRIST, IUSTI, CNRS, Aix-Marseille Universite, France — We present two experiments in which the interplay between stretching and bending modes in thin elastic plates plays an important role. The first experiment is motivated by the understanding of plant leaf shape (e.g. Maize leaves, grass). During growth, many leaves unfold to become flat while their bottom is still attached to the cylindrical stem. We investigate the mechanical analogue of this unfold length and address the question: what is the persistence length of a curvature applied at one end of a flat elastic strip? Simple scaling arguments are compared to experiments and numerical simulations using Surface Evolver. The second experiment concerns the snap-buckling instability of highly deformed plates, in relation to the noise of crumpling. Using high-speed video and three-dimensional shape reconstruction, we show that snap-buckling instabilities in thin plates are non-homogeneous and occur via the very fast propagation of an elastic defect. The speed of the transition and the acoustic signature of the snap are mainly controlled by the defect size.

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