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Wrinkling Crystallography on Curved Surfaces PEDRO REIS, Massachusetts Institute of Technology, MIHA BROJAN, Univeristy of Ljubljana, DENIS TERWAGNE, ROMAIN LAGRANGE, Massachusetts Institute of Technology
— We present results on an experimental analysis of the morphology of wrinkling patterns on curved surfaces. Our experimental hemispherical samples are fabricated using rapid prototyping and consist of a thin-stiff shell adhered to a soft-thick substrate, both made out of silicone-based rubbers. Pressurizing an inner spherical air cavity enables compression of the samples, thereby morphing the outer thin shell from its initially smooth configuration into a wrinkled state. A variety of patterns with different morphologies can be observed depending on the combination of the sample's geometric and material properties. We focus our attention on the specific pattern mode of hexagonal-like dimples, which we characterize by analyzing their surface profile using a digital 3D scanner. Through digital image processing, we skeletonize these patterns by identifying both the location of the ridges and determining the positions of the dimples. We give emphasis to the effect of curvature on the morphology and topology of these wrinkled patterns and focus on the tiling of the wrinkling units and their statistics of defects. Our results are contrasted with other crystalline planar and curved systems.

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