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A wrinkle-to-fold transition in curved floating shells DESISLAVA V. TODOROVA, University of Pennsylvania, OCTAVIO ALBARRAN ARRIAGADA, Max-Planck Institute for Dynamics and Self-Organization, LUCAS GOEHRING, Max-Planck Institute for Dynamics and Self-Organization, and Nottingham Trent University, ELENI KATIFORI, University of Pennsylvania — The generation of wrinkle patterns in thin elastic shells has attracted an increasing interest in both fundamental studies and practical applications. A spatially confined elastica or a flat elastic sheet exhibit regular sinusoidal wrinkles in response to an imposed small compressive confinement. For larger compression, the deformation energy becomes localized in small regions which ultimately develop folds. We consider the case where an elastic shell with a non-zero natural curvature, placed on a fluid substrate bends and wrinkles without compression. We discuss how the curvature can be viewed as an effective confinement and investigate how global constraints and local morphologies of the curved shells control the transition from regular wrinkles to composition of wrinkles and folds or fold-like structures. Further, we discuss various new strategies for creating and controlling patterns in thin elastic shells with natural curvature.

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