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Localization of Curvature and Relaxation of Stress Due to an Isolated Disclination in Crystalline Membrane YIWEI SUN, BENNY DAVIDOVITCH, GREGORY M. GRASON, University of Massachusetts Amherst — A crystalline membrane with an isolated disclination buckles below a critical thickness. Examples include mechanical models of viral capsids–pentavalent and hexavalent units assembled into triangulated shells–that show a pronounced faceting above a critical size. While buckling from the planar state has been studied previously in coarse-grained simulations, questions remain regarding the organization of structure and mechanics of the buckled state. Specifically, how is elastic stress distributed within the membrane; more precisely – how does this mechanical state evolve from the buckling threshold to the asymptotic limit of vanishing thickness, where the shape is expected to be isometric (conical) nearly everywhere? We employ a combination of numerical and analytic approaches to studying the solutions of the Föppl-von Kármán equations describing the shape of and stress in circular sheets possessing a 5-fold defect. Despite the complexity underlying the solution of these highly nonlinear relations, we search for much simpler set of mechanical principles to quantitatively capture the inhomogeneous concentration of stress and shape deformation throughout the full range of the von Kármán number.

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