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Folds and crease from wrinkles MAZEN DIAB, TENG ZHANG, RUIKE ZHAO, HUAJIAN GAO, KYUNG-SUK KIM, Brown University — We present stability and post bifurcation analyses of free-surface deformation from wrinkles to folds and creases, caused by lateral compression of a neo-Hookean material with varying elastic modulus with depth from the free surface. The post-bifurcation behavior of the wrinkle mode is investigated by high order perturbation as well as finite element analyses. We show that there is a critical strain beyond which the initial wrinkle mode is unstable. Using the finite element software ABAQUS, we reveal other deformation mode that may emerge due to the nonlinear bifurcation of the material surface. Bifurcation chart is constructed and shows that localized modes such as crease and fold may emerge depending on the geometric and material properties.

Mazen Diab
Brown University

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