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**Growth morphologies in active elastic bilayers** DAVID MAYETT, Syracuse University, SHILADITYA BANERJEE, James Frank Institute, The University of Chicago, J. M. SCHWARZ, M. CRISTINA MARCHETTI, Syracuse University — Many biological systems exhibit elastic instabilities ranging from buckling to folding to wrinkling. Such instabilities are typically driven by growth of the system. We explore the deformation properties of a layer of growing elastic material resting on a passive elastic substrate of finite thickness. We first show that there exists a mapping between the well-known Rodriguez formulation of growth and an active model where growth is incorporated via a component of the stress tensor describing the proliferation of active units in the elastic medium. Motivated by such systems as the epithelial cells making up the lining of the small intestines and sitting on top of the elastic stroma and the cerebral cortex of the brain that rests on the underlying white matter, we then use analytical and numerical approaches to show how the morphologies observed in different systems can be accounted for by different functional forms of the activity. Our active model of growth in elastic bilayer systems provides a simple, unified framework to classify the zoo of morphologies observed across seemingly different biological systems.

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