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Growth and Pattern Formation in Thin Elastic Shells SALEM AL MOSLEH, CHRISTIAN SANTANGELO, University of Massachusetts, Amherst, GEOMETRY OF SOFT MATTER TEAM — Heterogeneous growth plays an important role in shape and pattern formation in thin elastic shells, for example blooming lilies, rippling leaves, swelling polymer films and rod-like E. coli. In many of these examples the local growth could be coupled to the local geometry which poses interesting questions regarding stability and regulation. We model the growth process as a quasi-static time evolution of the metric, with fast elastic relaxation of the shape. A growth law is given by a coupling between the shape of the shell and the time derivative of the metric. We characterize the possible growth laws consistent with shell symmetries and study the stable shapes emerging from various growth laws. Finally we discuss possible applications to biological and experimental systems.

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