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Active Foam: Connecting Structure, Dynamics and Control[1]
LAUREL KROO, Department of Mechanical Engineering, Stanford University, MATTHEW BULL, Department of Applied Physics, Stanford University, MANU PRAKASH, Department of Bioengineering, Stanford University — By inflating and deflating voxels within a polydisperse 2-D air-liquid foam, we demonstrate an experimental system where we perturb soft materials in a radially-symmetric manner. These cyclic perturbations can be coordinated spatially and temporally to encode ("write") mechanical properties into the material. Using both a short-range mechanism (cascades of neighbor-swapping events) and a long-range mechanism (low-frequency acoustic), we discuss how to achieve a robust and morphable active material. Topics of interest include scaling analyses, noise, and accounting for complexity that arises from polydispersity and initial conditions. The goal of this work is to understand fundamental principles of confluent tissues and develop synthetic analogs.

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Laurel Kroo
Department of Mechanical Engineering, Stanford University

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