

Abstract Submitted
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Bubbles Rising Through a Soft Granular Material¹ ROBIN LE MESTRE, Département de Génie Mécanique, ENS Cachan, CHRIS MACMINN, Department of Engineering Science, University of Oxford, SUNGYON LEE, Department of Mechanical Engineering, Texas A&M University — Bubble migration through a soft granular material involves a strong coupling between the bubble dynamics and the deformation of the material. This is relevant to a variety of natural processes such as gas venting from sediments and gas exsolution from magma. Here, we study this process experimentally by injecting air bubbles into a quasi-2D packing of soft hydrogel beads and measuring the size, speed, and morphology of the bubbles as they rise due to buoyancy. Whereas previous work has focused on deformation resisted by intergranular friction, we focus on the previously inaccessible regime of deformation resisted by elasticity. At low confining stress, the bubbles are irregular and rounded, migrating via local rearrangement. At high confining stress, the bubbles become unstable and branched, migrating via pathway opening.

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