

Abstract Submitted  
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**Fingering in Confined Elastic Layers** JOHN BIGGINS, University of Cambridge, L. MAHADEVAN, Harvard, Z. WEI, Stanford, BAUDOIN SAINTYVES, Harvard, ELIZABETH BOUCHAUD, Commissariat à l'énergie atomique et aux énergies alternatives — Fingering has recently been observed in soft highly elastic layers that are confined between and bonded to two rigid bodies. In one case an injected fluid invades the layer in finger-like protrusions at the layer's perimeter, a solid analogue of Saffman-Taylor viscous fingering. In a second case, separation of the rigid bodies (with maintained adhesion to the layer) leads to the formation of similar fingers at the layer's perimeter. In both cases the finger formation is reversible: if the fluid is removed or the separation reduced, the fingers vanish. In this talk I will discuss a theoretical model for such elastic fingers that shows that the origin of the fingers is large-strain geometric non-linearity in the elasticity of soft solids. Our simplified elastic model unifies the two types of fingering and accurately estimates the thresholds and wavelengths of the fingers.

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