Instability in poroelastic media SATYAJIT PRAMANIK, NORDITA,
JOHN WETTLAUFER, NORDITA, Yale University, University of Oxford — Fluid
flow in deformable porous materials, which play significant role in different biological and geological systems of wide range of scales, is a highly nonlinear problem.
Feedback from the elastic deformation of the solid skeleton on the fluid flow and
vice-versa gives rise to pattern formation in the porosity structure of the skeleton
[1]. We view some of these patterns as instabilities of the coupled fluid-solid system. Due to highly nonlinear nature of the problem, very little has been understood
about this instability. Here, we use a minimal poroelastic theory to understand the
pattern formation in a fluid-saturated poroelastic material and discuss the similarities/differences with viscous fingering in non-deformable porous media.
[1] C. M. MacMinn, E. R. Dufresne, and J. Wettlaufer, "Fluid-driven deformation
of a soft granular material," Phys. Rev. X 5, 011020 (2015).

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