Abstract Submitted
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Fluid-driven fractures in brittle hydrogels[1] NIALL O'KEEFFE[2], PAUL LINDEN, Department of Applied Mathematics and Theoretical Physics, University of Cambridge — We study the physical mechanisms of fluid-driven fracture in low permeability reservoirs. This is done through the use of laboratory scale experiments on brittle heavily cross-linked hydrogels. These hydrogels have been shown to fracture similarly to "standard" brittle materials, such as PMMA and glass, which have been widely used to model geological mechanics. Crucially, the hydrogels are transparent, and permit fracturing at lower pressures and slower timescales. Their rheological properties can also be altered easily by varying the overall percentage of monomers and cross-linking molecules. Fracture dynamics are usually extremely hard to capture due to the fact that crack tips can approach material sound speeds. The sound speeds in these brittle hydrogels are 2-3 orders of magnitude less than in standard brittle materials. This allows us observe the complex fracture dynamics through the use of high speed camera techniques.

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