**20th European Mechanics of Materials Conference - EMMC20**
Florence, Italy | May 27th-29th, 2026
www.emmc20.unifi.it

# Frontiers in the characterization of poroelastic polymer solids

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*Paper ID: 509*
*Symposium S19: Mechanics of Materials: Current Frontiers and Emerging Challenges*

## Abstract

When biological materials, geosolids and polymeric gels deform and fail, there is a coupling between the mechanical stress and the flow of the pore fluid via the pore pressure. Calculations show that this coupling can strongly influence the volumetric deformation of free bodies subject to applied stress or varying fluid boundary conditions. Furthermore, this coupling can also alter the critical conditions for crack propagation in such solids. However, there is a relative dearth of experimental data that probe these responses in-situ. Using a combination of particle tracking with different poroelastic solids and solvents, we image the field of volumetric deformation for polymeric solids as the swell, deform and break. These measurements provide a direct evaluation of the consequences of poroelastic theory. I conclude with a brief discussion of potential implications for seismic activity.

## Keywords:

poroelasticity fracture polymeric solids Particle tracking