Contribution ID: **418** Type: **Poster Presentation**

Flow of a fluid with pressure-dependent viscosity through aging porous media

Tuesday, 23 May 2023 10:30 (1h 30m)

Considerable experimental evidence in a variety of porous materials (concrete, ceramics, bones, rocks) that undergo infinitesimal deformations makes it clear that material moduli depend on the density (identified as density dependence of Young's modulus).
The phenomean of material damage is a consequence of the inhomogeneity of the body as material properties detieriorate with deformation.
This is especially relevant for subsurface flows through geological media which have experienced deformation over millenia.
However, the most widely used models for subsurface flow (such as Darcy/Brinkman model) typically assume that the porous medium is a rigid skeleton. Even if one moves onto theories of poroelasticity, the porous solid is assumed to be a linearized elastic solid with constant values of material properties such as Young's modulus.
Within the framework of linearized elasticity, modelling damaged porous media with a density dependent Young's modulus is inconsistent and untenable due to the assumption of infinitesimal displacement gradient.
However, it is possible to incorporate density-dependent material moduli in the framework of implicit constitutive theories where the kinematic variable (strain) is expressed as a function of the stress.
Such a viewpoint remains unexplored in the context of flow of a fluid through porous media, and we shall illustrate the effect of damage by comparison with existing theories that ignore it completely.

Participation

In-Person

References

MDPI Energies Student Poster Award

No, do not submit my presenation for the student posters award.

Country

USA

Acceptance of the Terms & Conditions

Click here to agree

Energy Transition Focused Abstracts

Primary author: SRINIVASAN, Shriram

Presenter: SRINIVASAN, Shriram

Session Classification: Poster

Track Classification: (MS21) Non-linear effects in flow and transport through porous media