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Modeling geomaterials across scales

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In this paper, a predictive multiscale framework to concurrently homogenize the constitutive behavior of geomaterials will be presented. The main goal is to upscale, as a function of the deformation, key continuum variables governing deformation and hydraulic conductivity, key to modeling fluid flow through deforming porous media. The framework is general to geomaterials such as soils, rocks, and concrete and connects the well-established continuum formulation with physics-based micromechanical processes, thereby bypassing phenomenology. Even though the first step is aimed at upscaling strength and hydraulic properties, the framework opens the door to more complex applications were accurate linkage of hydro-thermo-chemo-mechanical processes take place and phenomenological models break down.

References

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