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MULTISCALE MODELING OF CONCRETE AND OTHER POROUS MATERIALS

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ABSTRACT

Predicting the coupled thermo-hygro-mechanical behaviour porous materials (e.g. soil, concrete) in the geometrically nonlinear regime is a fundamental task for a wide spectrum of important engineering applications, including soil mechanics, geophysics, biomechanics, material science, and in the simulation of industrial processes, to mention only a few [1-2]. When dealing with soils, recent advances in molecular dynamics and nano-scale measurements of material properties offer a new paradigm for understanding the multi-scale behaviour of complex natural materials. Recent studies use molecular models to simulate the hydration of montmorillonite and to predict elastic properties at different hydration states [3].For man-made porous media, such as concrete, the complex path-dependent responses are attributed to the highly heterogeneous microstructure and complex composite that may evolve over times. As a result, micromechanics analysis of the interaction between the various constituents are essential for deducing the macroscopic constitutive behaviour [4]. The goal of this mini-symposium is to provide a forum for researchers to exchange ideas and discuss recent developments in the modelling of concrete and other porous media. Contributions addressing the computational method developments, mechanics theory and the implementation, application, verification and validation of multiscale models are particularly welcome.

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