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## On the consolidation behaviour of double-porosity geomaterials

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Many natural and engineered geomaterials have double-porosity structure where two dominant pore systems coexist. Examples include structured soils where the two pore systems are inter-aggregate pores and intra-aggregate pores, and fissured rocks where the two pore systems are fissures and matrix pores. Although such double-porosity materials are frequently observed in geosciences and geoengineering applications, it remains mostly unclear how fluid flow and solid deformation interact differently in single- and double-porosity materials. The presentation explores this question through numerical simulation of consolidation – a paradigmatic problem in poromechanics – based on a recently developed modelling framework for fluid-infiltrated, inelastic materials with double porosity. Built on a combination of continuum principles of thermodynamics and standard plasticity theory, the framework can capture deformation, flow, and their coupling that occur individually in each pore system. Simulation results using this framework suggest that double-porosity structure gives rise to a two-staged consolidation behaviour, where the second stage appears similar to secondary compression in clays. It is also found that the simulated two-staged behaviour bears a striking semblance to experimentally observed consolidation processes in shales. These findings suggest that double-porosity structure may exert dominant control over the long-term hydro-mechanical behaviour of geomaterials.