Sanavia, L.; **Schrefler, B. A.**; **Steinmann, P.**

A formulation for an unsaturated porous medium undergoing large inelastic strains. (English) Zbl 1146.74319

Comput. Mech. 28, No. 2, 137-151 (2002).

Summary: This paper presents a formulation for a saturated and partially saturated porous medium undergoing large elastic or elastoplastic strains. The porous material is treated as a multiphase continuum with the pores of the solid skeleton filled by water and air, this last one at constant pressure. This pressure may either be the atmospheric pressure or the cavitation pressure. The governing equations at macroscopic level are derived in a spatial and a material setting. Solid grains and water are assumed to be incompressible at the microscopic level. The isotropic elastoplastic behaviour of the solid skeleton is described by the multiplicative decomposition of the deformation gradient into an elastic and a plastic part. The effective stress state is limited by the Drucker-Prager yield surface, for which a particular "apex formulation" is advocated. The water is assumed to obey Darcy's law. Numerical examples of strain localisation of dense and loose sand conclude the paper.

MSC:

74F10	Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)
74C15	Large-strain, rate-independent theories of plasticity (including nonlinear plasticity)
74L10	Soil and rock mechanics

Full Text: DOI