UNIVERSITÄT
DUISBURG
ESSEN

Prof. Dr.-Ing. Jörg Schröder
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Campus Essen

Datum 18.01.05

Einladung

Hiermit lade wir Sie im Rahmen des Mechanik/Numerische Mathematik Seminars zu folgendem Vortrag ein:

Vortragender:

Herr Prof. Dr.-Ing. Wolfgang Ehlers
Universität Stuttgart, Fakultät Bau- und Umweltingenieurwissenschaften
Institut für Mechanik (Bauwesen), Lehrstuhl II

Thema: „SLOPE FAILURE PROBLEMS IN SOIL MECHANICS."

Proceeding from heavy rainfall or flood water events, water infiltration into porous soil and, as a result, the interaction mechanisms between the pore water and the deformable soil skeleton are one of the major reasons for slope failure problems of, e. g., embankments and railroad or highway dams. The material behaviour presented above can be described by a continuum mechanical model for unsaturated soil based on a triphasic formulation embedded in the framework of the well-founded Theory of Porous Media.
The single constituents of such a model are a materially incompressible elasto-viscoplastic solid skeleton (soil), a viscous and materially incompressible pore liquid (pore water) and a materially compressible pore gas (air). The computational treatment is based on a weak formulation of the governing field equations, which, in the frame of quasi-static situations, result in the momentum balance of the whole aggregate, the volume balance of the pore liquid and the mass balance of the pore gas. The corresponding primary variables of the numerical treatment are the displacement of the solid skeleton and the effective pore pressures of the pore fluids. The resulting system of strongly coupled differential-algebraic equations is solved by the FE tool PANDAS, where the discretization is based on Taylor-Hood elements with quadratic shape functions for the solid displacement and linear shape functions for the pore fluid pressures.
Several 2-d and 3-d initial boundary-value problems are discussed in detail, where the capability of the presented model to describe infiltration-induced slope failure problems is pointed out. The presented computations are carried out both on single and multi-processor systems. Whereas in the 2-d case, the simulations can be efficiently solved on single processor systems, it turns out that large 3-d problems can only be computed by parallel strategies. Following this, the basic tool PANDAS is coupled with the FE solver M++ in order to handle the huge amount of unknowns arising from the discretization with Taylor-Hood elements in three dimensions.

Ort: Universität Duisburg-Essen, Standort Essen, Universitätsstr. 13

Raum: V13 S00 D50

Zeit: Freitag, 04.02.2005 um 14.00 Uhr

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