

COLLABORATIVE RESEARCH CENTER 837

## INTERACTION MODELING IN MECHANIZED TUNNELING

RUB

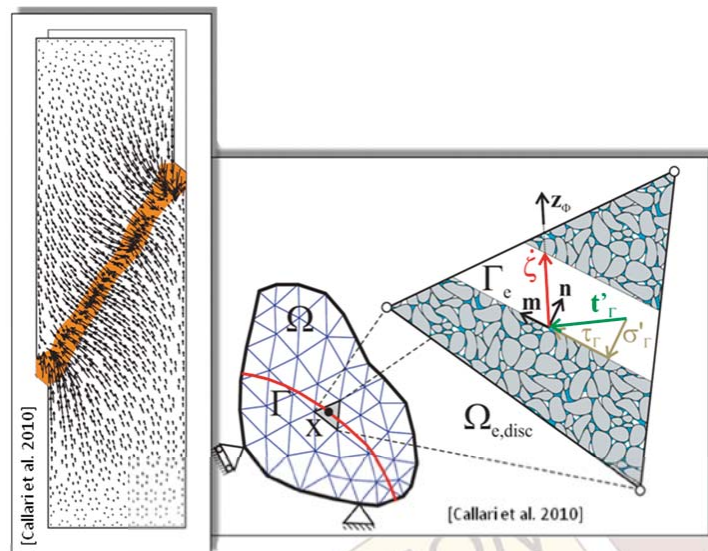
# Seminar: Strain Localization in Partially Saturated Porous Media: Thermodynamics, Numerical Formulation, Applications

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06.07.2011 – 15:00 ~ 18:00 h – IA 6/21

It is presented an analysis of discontinuous displacements and corresponding singular strains in variably saturated porous media, considering also the discontinuous flows and the corresponding singular distributions of fluid contents, to model the accumulation/drainage of gas and liquid along the localized failures. In this analysis, the continuum response is described by a three-phase poroplastic model, whose hyperelastic part is a simplified version of more general laws recently developed within a computationally oriented thermodynamic approach based on Biot work. The appearance of



of aforementioned strong discontinuities and their constitutive behaviour are modeled in a multi-scale framework, where the small-scale problem is defined by a localized law in terms of an effective traction and by localized mass balances of liquid and gas, both related to singular dilatancy at the displacement discontinuity. Small-scale and large-scale coupled problems are connected by imposing weak equilibrium between the traction on the discontinuity and stresses in the bulk. This equation is then approximated by finite elements enhanced with singular fields of strain and fluid contents. Several numerical simulations are presented to illustrate the range of application of proposed models and the performance of the new finite element methods.

**Guests are sincerely welcome!**