



INTERDISCIPLINARY CENTRE FOR
ADVANCED MATERIALS SIMULATION

ICAMS Seminar

Prof. Holger Steeb

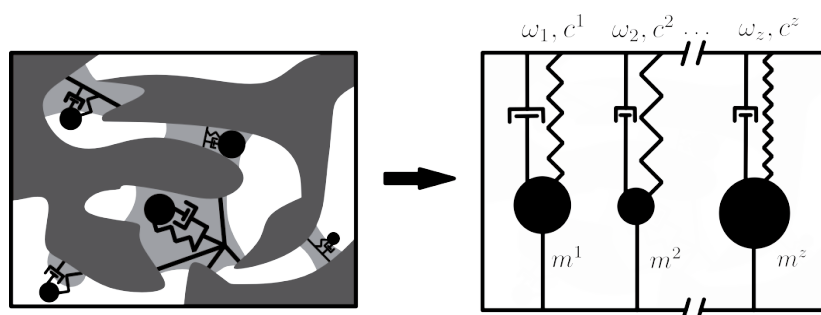
Ruhr Universität Bochum, Germany

Monday, April 22, 4:30 p.m. ICAMS Seminar room 0.08

Modeling geomaterials – A challenge of material modeling

Particular physical properties of materials like negative effective moduli (mass/density, stiffness, electric permittivity and magnetic permeability) have been observed, and physically explained, in various man-made metamaterials. In more or less all cases, these materials are based on periodic (lattice-like) microstructures. In contrast to such man-made materials, the microstructures of geomaterials, like porous rocks or soils, are intrinsically disordered and non-periodic. It will be shown, that a recently proposed multi-phase continuum model, describing acoustic waves in residual saturated porous rocks, is able to determine a similar phenomenon, namely a negative partial density effect close to the resonance frequency of disconnected (non-wetting) fluid phases.

Technically, the presented approach is based on a space-time upscaling technique for multi-phase materials. Therefore, (numerical) homogenization techniques for multi-phase, i.e. fluid-saturated geomaterials will be presented. Further examples for patchy-saturated (bulk-diffusion) and diffusion in fractures will be discussed.



Microscale rheology of trapped water phases

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