Technische Universität Braunschweig

MUSEN

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Modelle für die Beschreibung der Zustandsänderung bei Alterung von Baustoffen und Tragwerken

MUSEN Kolloquium im Sommersemester 2019

Prof. Dr.-Ing. Tim Ricken

Institute of Mechanics, Structural Analysis and Dynamics - University of Stuttgart

Multiscale Simulation of Multiphase Materials

Donnerstag, 25.04.2019, 16.45 Uhr
Okerhochhaus, Seminarraum EG
Pockelsstraße 3, 38106 Braunschweig

Many materials show a multiphase composition and have a distinct microscopic structure. Examples of multiphase materials are saturated or partly saturated porous material like soil, concrete but also steel and biological tissue like cartilage or bone. Their substructures are e.g. pores, fibres with different orientations or cells which can be influenced by bio-chemical reactions.

The high complexity of those kind of material makes it reasonable to consider homogenization approaches and multiscale techniques in order to find an effective modeling access for the numerical simulation. This is even more the case since modern experimental methods as CT-scanning or MRI imaging give us the opportunity to get a deep insight into the microscale structure.

Thus, we will present a combined multiphase-multiscale approach for the description of those kinds of materials. The method is based on the well-known Theory of porous media (TPM), a continuum mechanical homogenization approach founded on the mixture theory in combination with the concept of volume fraction, cf. de Boer (1) and Ehlers (2).

Depending on the material, we will combine the TPM with reasonable multiscale techniques such as FE 2 , POD-ODE, or the Phase Field method, cf. Moj et al. (3) and Ricken et al. (4).

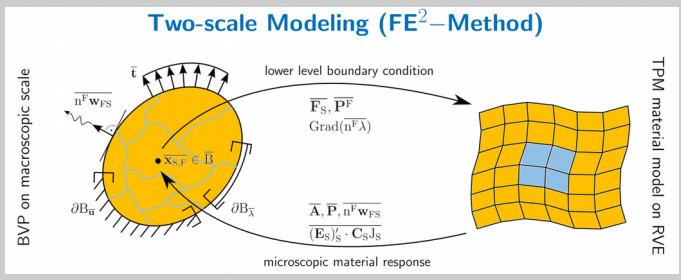

Fig. 1. Basic concept of TPM 2 approach

References:

(1) de Boer [2000] Springer-Verlag.

(2) Ehlers [2002] Springer-Verlag, 3-86.

(3) Moj, L.; Foppe, M.; Deike, R.; Ricken, T. [2017] GAMM-Mitteilungen 40 (2), 125-137.

(4) Ricken, T.; Werner, D.; Holzhütter, H. G.; König, M.; Dahmen, U.; Dirsch, O. [2015] Biomech Model Mechanobiol 14 (3), 515-536

Kontakt

Graduiertenkolleg 2075

Technische Universität Braunschweig
Beethovenstraße 51
38106 Braunschweig
0531 - 391-3668
grk-2075@tu-bs.de
www.tu-braunschweig.de/grk-2075

MUSEN - Center for Mechanics, Uncertainty and Simulation in Engineering

Technische Universität Braunschweig
Pockelsstraße 3
38106 Braunschweig
0531 - 391-94351
MUSEN@tu-bs.de
www.tu-braunschweig.de/musen