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LECTURE NOTES

20

# Modelling Coupled Phenomena in Saturated Porous Materials

Advanced Course  
Bydgoszcz, June 2-6, 2003

*edited by*

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Centre of Excellence for  
Advanced Materials and Structures



National Centre of Excellence  
for Porous Media

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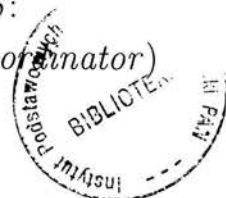
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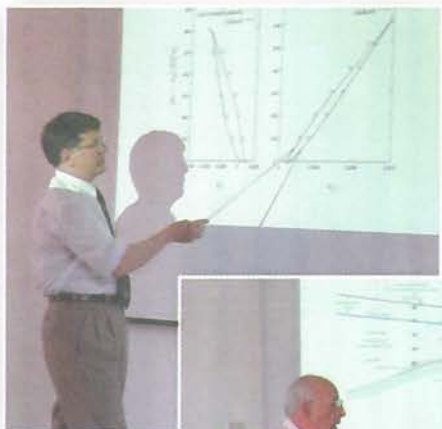
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Lecturers and participants in the Advanced Course  
**Modelling Coupled Phenomena in Saturated Porous Media**

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## *Foreword*

The contents of this volume were delivered at an AMAS Advanced Course, held in Bydgoszcz from June 2-6, 2003, which addressed "Modelling Coupled Phenomena in Saturated Porous Materials". The course programme was designed to bring together lecturers who approach the modelling of such phenomena from a variety of contexts, viewpoints and aims, with the intention of providing participants with a broad framework for future researches. The lecture notes are being published to provide source material for PhD students and young researchers interested in studying, developing, and applying the models here discussed. Relevant fields of application include biomechanics, civil and environmental engineering, and the earth and material sciences. Contained in this volume are eight contributions.

*In toto* these treat both general physical and mathematical foundations underlying the subject and specific, context-dependent, models. The links between microscopic and macroscopic continuum modelling are addressed from two perspectives, and balance equations and constitutive relations are discussed from several viewpoints including that of thermodynamics. Fluid flows through rigid porous materials are considered with particular regard to contaminant transport. Coupled quasi-static mechanical, chemo-mechanical, and electro-chemo-mechanical, processes are treated with applications to the modelling of phenomena as diverse as rock/earth consolidation, non-linear response of rock-like solids due to the presence of microcracks, and *in vivo* behaviour of blood and biological tissue.

It is to be hoped that the spirit of mutual respect and interest shared by lecturers and participants in the course, regarding the diversity of viewpoints, motivations, and modelling approaches represented in the lectures, will be communicated to readers of this volume.

The Course Co-ordinators  
J. Kubik  
M. Kaczmarek  
I. Murdoch

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