

Preface

This is the third volume of the THMC benchmark book series dealing with benchmarks and examples of thermo-hydro-mechanical-chemical processes in fractured porous media:

1. <http://www.springer.com/de/book/9783642271762>
2. <http://www.springer.com/de/book/9783319118932>

Recently, the benchmark books became items of the new book series in “Terrestrial Environmental Sciences” <http://www.springer.com/series/13468>.

The book is subtitled with “Benchmarking Initiative” as we give a short outline about those activities in past and ongoing of benchmarking initiatives such as DECOVALEX, SeS-Bench (Steeffel et al. 2014), MoMaS, etc. These initiatives provide a substantial contribution to the idea of benchmarking codes and improving numerical modeling of coupled processes in porous and fractured media. Other related benchmarking activities in hydrology and carbon capture storage (CCS) are HM-INTERCOMP Maxwell et al. (2014) and CO2BENCH Kolditz et al. (2012a).

The book structure follows the “classic” scheme, first single processes and then coupled processes with increasing complexity. The list of symbols and an index can be found at the end of the book. With this book we also want to award the work of merit of distinguished scientists in the field “Modelling and Benchmarking of THMC Processes.” The contributing scientists and institutions are acknowledged in the introduction. In appendices we present new features of GINA, the OGS pre-processing tool for geotechnical applications as well as an overview of the new ogs⁶ version that is coming soon.

With this version we also provide the input files for self-exercises. This can be found at the OGS community page <http://docs.opengeosys.org/books> (figure next page) where you can also find the material of the first published OGS Tutorials on “Computational Hydrology I” (Sachse et al. 2015).

- <http://www.springer.com/de/book/9783319133348>

and “Introduction to Geothermal Processes”. Enjoy reading and exercising.

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Computational Energy Systems I: Basics of Geothermal Processes beginner

This tutorial presents the introduction of the open-source software OpenGeoSys (OGS) for geothermal applications. The material is based on several national and international training courses (e.g. Korea 2012 and China 2013). The book contains general information regarding heat transport modeling in porous and fractured media and step-by-step model set-up with OGS and related components such as the OGS Data Explorer. Five benchmark examples are presented in detail. This book is intended primarily for graduate students and applied scientists, who deal with geothermal system analysis. It is also a valuable source of information for professional geoscientists wishing to advance their knowledge in numerical modelling of geothermal processes including thermal convection processes. As such, this book will be a valuable help in training ...

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Thermo-Hydro-Mechanical-Chemical Processes in Fractured Porous Media: Modelling and Benchmarking beginner intermediate advanced

The second book in the OpenGeoSys benchmarking series provides guidance to understanding complicated coupled processes based on the experimental data available and implementation of developed algorithms in numerical codes. Results of selected test cases in the fields of closed-form solutions (e.g., deformation processes), single processes (such as groundwater flow) as well as coupled processes are presented. It is part of the OpenGeoSys initiative - an open source project to share knowledge and experience in environmental analysis and scientific computation with the community. The second volume mainly is dedicated to "closed form solutions" developed and provided by Dr. Peter Vogel (BGR). You will find the packed input files for Chapter 2 as an attachment. Inside take a look at the file ...

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Computational Hydrology I: Groundwater Flow Modeling beginner

This tutorial on the application of the open-source software OpenGeoSys (OGS) in computational hydrology is based on a one-week HIGRADE-course at the Helmholtz Centre for Environmental Research in Leipzig, Germany. The book contains general information regarding hydrological and groundwater flow modelling and the pre-processing and step-by-step model set-up of a case study with OGS and related components such as the OGS Data Explorer. In addition, it also illustrates the application of pre- and post-processing tools such as ArcGIS or ParaView for the preparation of input data as well as the optimal presentation of simulation results. This OGS tutorial is the result of close cooperation of the Helmholtz Centre for Environmental Research (UFZ) with partner universities (Technische Universität Dresden, Christian-Albrechts ...

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Olaf Kolditz
Uwe-Jens Görke
Hua Shao
Wenqing Wang
Sebastian Bauer

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