Eidgenössische Technische Hochschule Zürich
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Institut für Fluiddynamik: Prof. P. Jenny, Prof. T. Rösgen
Computational Science & Engineering Laboratory: Prof. P. Koumoutsakos

16/07/2014

E I N L A D U N G

zu einem Vortrag im Rahmen des

Kolloquiums Thermo- und Fluiddynamik

Datum: **Mittwoch, 13. August 2014**

Zeit: **16:15 Uhr**

Ort: Maschinenlaboratorium ETH Zürich
>> Hörsaal ML F 39 <<

Referent: **Prof. Sebastian Geiger**
Institute of Petroleum Engineering
Heriot-Watt University, Edinburgh, UK

Titel: **Numerical Simulation of Fractured Reservoirs Across Multiple Scales**

Fractured geological formations contain over half of the world's remaining hydrocarbon reserves and are of equal importance for unconventional energy resources such as geothermal and shale gas reservoirs. Providing reliable forecasts of future oil, gas, or heat production from these reservoirs through numerical simulation is one of the great challenges in reservoir simulation. Today, the fundamental conceptual model to simulate fluid flow in fractured reservoirs is mostly still based on Warren and Root's 50-year old dual-continua model, which represents the fractures as the flowing domain with little storage and the porous matrix as the stagnant/low-permeability domain with significant storage. A transfer function quantifies the fluid exchange between the two domains. The dual-continua model is often applied in finite difference simulators where equivalent properties (e.g. permeability, porosity) are computed in each reservoir simulation grid block for both, fracture and matrix, through upscaling.

This presentation will discuss new insights into multiscale fractured reservoir modelling and simulation where we resolve the small-scale physics of fracture-matrix fluid transfer in heterogeneous geological formations at the grid block scale using a novel multi-rate dual-continua model. This model is based on exact analytical solutions of the underlying physics. Above the grid block scale, we use unstructured grids to provide the geometric flexibility that enables us to resolve large-scale fractures, fracture corridors, faults and other reservoir elements that cannot, and should not, be upscaled. Unstructured grids also allow us to adapt the mesh resolution such that the upscaling error is minimised. The overall aim is to develop integrated reservoir modelling and simulation workflows for fractured reservoirs where geoscientists and engineers can focus on the inherent geological uncertainties in fractured reservoirs, rather than struggling with model errors that are caused by inadequate model concepts, numerical errors, and upscaling.

Host: Prof. P. Jenny

Gäste sind willkommen!

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