Einladung zum Vortrag

High-order discontinuous Galerkin methods for flows in porous media: High-fidelity viscous fingering computations on fully unstructured meshes

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Viscous fingering phenomena occur naturally in a number of important porous media flow applications. When a flow is displaced in a porous medium under an adverse mobility ratio, finger-like structures naturally occur as the result of flow instability. Their impact can be significant in a number of subsurface engineering applications, such as carbon sequestration and enhanced oil recovery. Reservoir simulators currently used in petroleum engineering applications rely on low-order numerical formulations (of finite difference or finite volume type). These formulations, although robust and efficient, do not possess the fidelity necessary to attack viscous fingering instability problems, and are furthermore very sensitive to mesh orientation. A new method is proposed in this talk to address these issues: It is based on a discontinuous Galerkin discretization of the porous media flow equations and leads to arbitrarily high-order discretizations on fully unstructured meshes. The combination of these two features is essential to provide a viable strategy to high-fidelity computations of viscous fingering in practical engineering scenarios. Numerical examples in the context of carbon sequestration and reservoir engineering problems will be presented.

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11:00 Uhr **MW 0250**

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