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**MAMERN'07 INVITED SPEAKER**

[Peter Bastian](#) (univ. of Stuttgart, Germany)

**Discontinuous Galerkin Methods for Simulation of Transport Processes in Porous Media**

*(Joint work with Christian Engwer and Sreejith Pulloor Kuttanikkad)*

Mathematical modelling of flow and transport processes in porous media leads to coupled partial differential equations of elliptic and parabolic/hyperbolic type. Discontinuous Galerkin methods are based on a fully discontinuous piecewise polynomial approximation together with certain weak continuity constraints at inter element boundaries and are very well suited for elliptic as well as parabolic/hyperbolic equations. They are locally conservative, heterogeneous permeability fields are treated with similar accuracy and efficiency as in the mixed finite element method and shocks can be represented accurately. In this talk we present and compare some of these methods for single phase flow and transport as well as two-phase flow. Moreover, discontinuous Galerkin methods provide a new approach for solving equations in complicated domains which is illustrated by an application to the flow around root networks.

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