Contribution ID: **649**   Type: **Poster + 3 Minute Pitch**

High-Order Conservative Flux Optimization Finite Element Methods

Wednesday, 16 May 2018 17:10 (2 minutes)

In this talk, the speakers will introduce a high order flux-conservative finite element method for the fluid flow model equations in porous media. The numerical schemes are based on the classical Galerkin finite element method enhanced by a flux approximation on the boundary of a prescribed set of control volumes. The numerical approximations can be characterized as the solution of a constrained-minimization problem with constraints given by the flux conservation equations for each control element. The discrete linear system is a typical saddle-point problem, but with less number of degrees of freedom than the standard mixed finite element method, particularly for elements of high order. Error estimates of optimal order will be presented for the numerical flux as well as the pressure approximations. The speakers will also present some numerical results to demonstrate the performance of the new method on some synthetic test examples, including a simplified two-phase fluid flow model in highly heterogeneous media.

References

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Session Classification: Parallel 8-H

Track Classification: MS 2.12: High order schemes for simulation of flow and transport in porous media