1110-76-202 **Jiangguo Liu*** (liu@math.colostate.edu), Department of Mathematics, Colorado State University, Fort Collins, CO 80523. *A Comparative Study of Finite Element Methods for Darcy Flow Computation.*

The Darcy equation is a fundamental equation for flow and transport problems in porous media. There exist plenty of finite element methods for solving the Darcy equation: the continuous Galerkin methods, the discontinuous Galerkin methods, the mixed methods, and the newly developed weak Galerkin methods. In this talk, we present a comparative study of these methods on Darcy flow computation, particularly on their scheme formulation, accuracy, properties, and Matlab implementation. It is demonstrated that the weak Galerkin methods are locally conservative by design, produce continuous normal fluxes across element interfaces, need no penalty factors, and result in symmetric positive-definite linear systems that are easier to solve, compared to the saddle-point problems. Moreover, we will show that the novel weak Galerkin methods are somehow equivalent to the classical mixed methods. This talk is based on the joint work with Guang Lin (Purdue), Lin Mu (Michigan State), Farrah Sadre-Marandi (ColoState), and Xiu Ye (UALR). (Received February 20, 2015)