1146-35-4 **Michael P Presho*** (mpresho@semo.edu). *Modeling of tracer flow via a constrained, mass conservative generalized multiscale finite volume/element and stochastic collocation.*

In this presentation we consider an inverse flow problem with a high-contrast and stochastic permeability coefficient. Due to the large number of forward PDE solves necessary for treating the problem, a constrained version of the Generalized Multiscale Finite Element Method (GMsFEM) is used in order to reduce the global dimension of the pressure solutions. Since the permeability coefficient exhibits a large variation in scales, GMsFEM allows us to construct coarse solutions that are able to accurately capture the underlying fine effects of the system. To ensure a local mass conservation property, Lagrange multiplier constraints are used in the problem formulation. We also employ the use of a sparse-grid collocation so that rather than recomputing the eigenfunctions and basis functions for each realization, a fixed set of collocation points may be used for the pre-computations. In doing so, we are able to employ a combination of a mass conservative version of GMsFEM-FV and sparse-grid collocation to effectively solve the flow model equations. (Received October 25, 2018)