1056-65-925 **Aycil Cesmelioglu*** (aycil.cesmelioglu@rice.edu), Rice University, Computational and Applied Mathematics Dept., 6100 Main St. MS-134, Houston, TX 77054. *Analysis and simulation of a multiphysics and a multiphase problem.*

First, we analyze and simulate the Navier-Stokes and Darcy flow problem coupled to a transport equation by the velocity field, modeling the transport of the contaminants through lakes and rivers. Using a numerical scheme based on Backward Euler and a discontinuous Galerkin (DG) method over the whole domain, we obtain an error that is optimal in space and first order in time. Second, we develop high order DG methods for the flow in porous media of three immiscible fluids such as water, oil and gas. The proposed discretization, based on the DG methods in space and the backward Euler method in time is decoupled by solving sequentially and time-lagging the nonlinear coefficients. (Received September 18, 2009)