1067-65-1061 **Thomas F. Russell*** (trussell@nsf.gov), National Science Foundation, Office of Integrative Activities, 4201 Wilson Blvd., Room 1270, Arlington, VA 22230. *Locally mass-conservative Eulerian-Lagrangian methods for multiphase multicomponent transport.*

Secondary and tertiary recovery of hydrocarbons and contaminant transport in groundwater are among the subsurface flow processes that are frequently advection-dominated. These geomathematical settings lead to efforts to incorporate Lagrangian techniques into numerical schemes. Compared with purely Eulerian schemes, when Eulerian-Lagrangian methods (ELMs) work well, ELMs can obtain more accurate results on coarser grids and with larger time steps. In particular, CFL limitations, numerical dispersion, and non-physical oscillations can be avoided. For nonlinear multiphase transport, a key to formulating conservative ELMs is the physical insight that emerges from an adjoint system, whose Lagrangian characteristics represent mass movement rather than wave propagation. The talk will formulate ELMs for multiphase multicomponent transport and will present some recent results. (Received September 17, 2010)