1085-60-119 **Larry Winter*** (winter@email.arizona.edu), 1133 East James E. Rogers Way, Tucson, AZ 85721, **Jeffrey Hyman** (jhyman@math.arizona.edu), Tucson, AZ 85721, and **Piotr Smolarkiewicz**, Boulder, CO 80307. *Computational Physics of Fluid Flow Through Explicit Pores Spaces.*

The advent of high-performance computers and advanced fluid dynamics simulators permits computational experiments with flow through realistic three-dimensional pore spaces that are equivalent in accuracy to physical experiments while yielding unprecedented levels of detail about the properties of flow fields. Flow through samples of explicit pore-spaces can be simulated efficiently while reproducing key physics by combining non-oscillatory (viz. high-resolution) Navier-Stokes integrators with semi-implicit representation of elementary (first-order) immersed-boundary forcing, since the macroscopic uncertainty of the flow regime greatly exceeds numerical inaccuracies in detailed representation of internal boundaries [Smolarkiewicz & Winter, J. Comput. Phys. 229 (2010) 3121]. In this talk, we compute attributes of particle trajectories including tortuosity, trajectory length, and first passage percolation time. The fluid velocity fields become more homogeneous with rising porosity indicated by a decrease in the variance of tortuosity, trajectory length, and travel time distributions. A nonlinear relationship between the dimensionless quantities of porosity and tortuosity is also proposed. (Received September 05, 2012)