Abstract Submitted
for the OSF15 Meeting of
The American Physical Society

Drude Infiltration: Hastening the Study of Percolation in Porous Materials DONALD PRIOUR, Youngstown State University — In some permeable media, transport of fluid or charge occurs through well defined channels. However, in the case of porous materials made up of randomly placed grains (e.g. spheres or polyhedrons), the connectivity of intersecting voids allowing transport on a macroscopic scale is difficult to assess a priori. While techniques such as the Hoshen-Kopelman algorithm are effective in cases where the connectivity scheme is clear, a calculation in which virtual tracer particles bounce from one impenetrable barrier particle to the next (e.g. via specular reflection) permits the exploration of voids in a rigorous fashion to determine whether the system is permeable at a macroscopic level. We discuss a scheme in which a unidirectional infiltration of a porous material is set up by using charged virtual tracer particles subject to a uniform electric field, a realization of the Drude model for charge transport which is adopted in this work to hasten the determination as to whether the system percolates. Preliminary results obtained for percolation through voids among randomly placed penetrating spheres are discussed, and we examine generalizations of unidirectional infiltration calculations to porous materials comprised of non-spherical (e.g. tetrahedral, cubic, or octohedral) grains.

Donald Priour
Youngstown State University

Date submitted: 25 Sep 2015 Electronic form version 1.4