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Percolation Thresholds in Angular Grain media: Drude Directed Infiltration DONALD PRIOUR, Youngstown State University — Pores in many realistic systems are not well delineated channels, but are void spaces among grains impermeable to charge or fluid flow which comprise the medium. Sparse grain concentrations lead to permeable systems, while concentrations in excess of a critical density block bulk fluid flow. We calculate percolation thresholds in porous materials made up of randomly placed (and oriented) disks, tetrahedrons, and cubes. To determine if randomly generated finite system samples are permeable, we deploy virtual tracer particles which are scattered (e.g. specularly) by collisions with impenetrable angular grains. We hasten the rate of exploration (which would otherwise scale as $n_{\mathrm{coll}}^{1/2}$ where n_{coll} is the number of collisions with grains if the tracers followed linear trajectories) by considering the tracer particles to be charged in conjunction with a randomly directed uniform electric field. As in the Drude treatment, where a succession of many scattering events leads to a constant drift velocity, tracer displacements on average grow linearly in n_{coll}. By averaging over many disorder realizations for a variety of systems sizes, we calculate the percolation threshold and critical exponent which characterize the phase transition.

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