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**Electric Field Driven Void Percolation Around Spheres and Plates** NICHOLAS MCGUIGAN, DONALD PRIOUR, Youngstown State University — In practice, fluid flow through technologically relevant materials is not through well defined channels but through voids around barrier particles. In spite of the structural disorder, percolation phenomena are seen where below a critical density of impenetrable particles macroscopic flow is possible, whereas above this density threshold bulk fluid transport is blocked. As representative examples we examine systems composed of randomly placed spheres and infinitely thin plates, for which in the latter case the plate orientations are also random. The former system serves as a validation of our approach which involves charged tracer particles driven through the matrix by a uniform electric field with collisions with barrier particles taken into account as specular reflections. In the case of a medium comprised of disordered plates with zero thickness, our calculation of the critical density of plates is the first calculation of the percolation threshold for this system. The unidirectional exploration of our electric field driven approach is an element which significantly enhances both the computational efficiency and system sizes accessible.

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