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DNS of inertial flows in porous media: Assessment of mesh quality and resolution[1] JUSTIN FINN, SOURABH APTE, BRIAN WOOD, Oregon State University — At modest flow rates ($10 \leq Re \leq 300$) through porous media and packed beds, fluid inertia can result in complex steady and unsteady recirculation regions, dependent on the local pore geometry. We present methods to parameterize and simplify mesh generation for packed beds, with an eye toward obtaining efficient mesh independence for Reynolds numbers in the inertial and unsteady regimes. To handle the geometric singularity at the sphere-sphere and sphere-wall contact points, we use a *fillet bridge model*, in which every pair of contacting entities are bridged by a fillet, eliminating a small fluid region near the contact point. A second order accurate, parallel, incompressible flow solver [Moin and Apte, AIAA J. 2006] is used to simulate flow through three different sphere packings: a periodic simple cubic packing, a wall bounded hexagonal close packing, and a randomly packed tube. Mesh independence is assessed using several measures including Ergun pressure drop coefficients, viscous and pressure components of drag force, kinetic energy, kinetic energy dissipation and interstitial velocity profiles. Progress toward large scale simulations of flow through randomly packed 10^3 pores will be discussed.

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