Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Hydrodynamic interactions between permeable particles RODRIGO REBOUCAS, MICHAEL LOEWENBERG, Yale University — An analysis is presented for pairwise hydrodynamic interactions between permeable spherical particles in the limit of weak permeability, $K = k/a^2 \ll 1$, where k is the permeability, and a is the reduced radius of the particles. Except for the near-contact motion of the particles, hydrodynamic interactions can be approximated by smooth spheres, the permeability having a weak perturbative effect under these conditions. However, non-zero particle permeability qualitatively affects the near-contact axisymmetric motion, eliminating the classical lubrication singularity for smooth spherical particles. An integrodifferential lubrication equation incorporating Darcys law for flow inside the particles describes the near-contact motion of permeable spheres under weak permeability conditions. Collision efficiencies and hydrodynamic diffusivities are calculated and it is shown that permeable spherical particles are hydrodynamically equivalent to rough spheres with roughness $\delta/a \approx K^{2/5}$.

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Date submitted: 31 Jul 2019 Electronic form version 1.4