Abstract Submitted
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Effects of Size Polydispersity on Pharmaceutical Particle Packings[1] MEENAKSHI DUTT, University of Cambridge, BRUNO HANCOCK, Pfizer USA, CRAIG BENTHAM, Pfizer UK, JAMES ELLIOTT, University of Cambridge — Pharmaceutical powder blends are multicomponent mixtures of excipients and the drug powder particles which have irregular shapes with equivalent diameters typically ranging from 40 microns to 300 microns. We consider idealizations of such systems with emphasis on the size dispersity in a pure excipient powder comprised of spherical particles. We study the characteristics of the particle packings generated through gravitational compaction followed by uniaxial compaction via Discrete Element Method simulations (Dutt et al., 2004 to be published). We present results for two common excipients: microcrystalline cellulose (MCC) and sucrose. For each excipient, we vary the degree of dispersity in the diameters of the particles. For insight into the geometrical characteristics of the particle packings, we calculate the coordination number, packing fraction, radial distribution functions and contact angle distributions for the various mixtures. The evolution of the force and stress distributions along with the stress-strain relations are calculated for each system. We discuss comparisons of these quantities for systems with different size dispersity and material properties. For MCC and sucrose mixtures with narrow size distributions (195-225 microns, 170-260 microns), the average packing fraction and coordination number prior to and after uniaxial compaction decreases with interparticle friction, in agreement with results for monodisperse spheres (Silbert et al., Phys. Rev. E (2002)).

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