The Behavior of Ultrafine Particles in the Absence and Presence of External Fields[1] MEENAKSHI DUTT, University of Cambridge, BRUNO HANCOCK, CRAIG BENTHAM, Pfizer Global R & D, JAMES ELLIOTT, University of Cambridge — Length scales of particles and their surrounding medium strongly determines the nature of their interactions with one another and their responses to external fields. We are interested in systems of ultrafine particles (0.1 - 1.0 micron) such as volcanic ash, solid aerosols, or fine powders for pharmaceutical ihalation applications. We develop a numerical model for these systems using the Derjaguin-Muller-Toporov (DMT) adhesion theory along with the van der Waals attraction between the particles and their contact mechanical interactions. We study the dynamics of these systems in the absence and presence of gravity by controlling the particle size, and thereby, the surface properties of the particles. Finally, we explore the response of these systems to external fields by studying the evolution of the internal microstructure under contant load and shear strain.

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