Three-Dimensional, Rapid Shear Flow of Particles with Continuous Size Distributions

S. Dahl, R. Clelland*, and C. Hrenya
Department of Chemical Engineering
***Department of Mathematics**
University of Colorado at Boulder

Rapid granular flows occur in nature and industry, and often contain particles of many sizes. Over the last two decades, significant theoretical and experimental effort has been directed at rapid granular flows with monodisperse or binary particle size distributions. In contrast, the behavior of rapid granular flows with more than two particle sizes has received only limited attention. The particle size distributions in many natural and industrial granular flows may be represented as continuous distributions (e.g., Gaussian or lognormal distributions), providing incentive for the investigation of rapid granular flows with these particle size distributions. As an extension of previous work for two-dimensional simulations of rapid shear flows with Gaussian and lognormal particle size distributions, this work is directed at *three-dimensional* flows with continuous size distributions. Event-driven, discrete-particle ("molecular-dynamic") simulations are employed for the simple shear flow of smooth, spherical particles with Gaussian and lognormal particle size distributions. The results parallel those found previously in two dimensions, and demonstrate the effect of distribution width on the stress tensor and granular energy.