382a Challenges in Quantitative Analysis of Particulate Flows

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Flows of granular materials and gas-particle mixtures are encountered in a wide range of process applications, and they pose many challenges. In this lecture, I will discuss a few outstanding fundamental issues in quantitative modeling of particulate flows. These include rheological behavior of cohesive powders and its manipulation through dry coating, flow of granular materials in the transitional regime bridging quasistatic and rapid flow regimes, influence of particle size distribution on fluid-particle drag force and coarse-grained equations of motion and associated closures for large scale process modeling. I will discuss briefly the state-of-the-art understanding about each of these and outline a set of questions which are prime candidates for further research.