

Solid-fluid mixture models for high particulate volume fractions

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ABSTRACT

In applications like sanding, drilling, grinding (concrete or wood dust in air), coring (concrete in water) and industrial vacuums, solid particles are transported with a fluid. The motivation of this project is to develop a computational model that allows to investigate the particle transport in order to improve tool performance and endurance on the one hand, and to comply with ever-tighter government regulations on dust emissions on work sites on the other hand. Some of the challenging aspects that make current approaches fail, are the high particle load, the need to predict accretion/deposition, particle interaction with the walls, etc. In this project we will tackle this problem via a highly efficient coupled particle-fluid method. Based on this model and respective insight, extensions for a mixture-model will be derived that should allow simulation of such problems at a much better quality than currently available mixture-model approaches and at much lower costs as fully resolved simulations.