

Numerical simulation of powder mixing by an elastic blade

Shin Mizutani¹ and *Mikio Sakai¹

¹School of Engineering, The University of Tokyo, Japan.

*Corresponding author: mikio_sakai@n.t.u-tokyo.ac.jp

Interaction between solid particles and an elastic body becomes in many fields such as an electrophotographic system. Observing the bulk condition is substantially impossible, and the methodology of granular flow – elastic solid coupled analysis, especially including geometric nonlinearity, had not been established. It is because that Finite Element Method (FEM) is not good at simulating the multibody contact problem.

Accordingly, we developed the coupled analysis method using Discrete Element Method (DEM) and Finite Deformation theory based Particle Method (FD-PM), which can simulate the large deformation of the elastic body. The extra algorithm is not required to combine these two methods because FD-PM and DEM are both the Lagrangian methods. A mixing simulation and an experiment in the same scale were executed for verification. The movement of the granular flow and deformation of the elastic solid was measured, and simulation results were good agreement with the experimental ones.

Keywords: granular flow analysis, elastic solid analysis, coupled analysis, large deformation, multibody contact problem