

Design and Analysis of Powder Handling Processes by Numerical Simulation

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Nowadays, numerical simulations such as DEM (Discrete Element Method) and CFD (Computational Fluid Dynamics) have become powerful and realizable tools for the analysis and visualization of granular flow in powder handling processes. This paper briefly reviews recent trend of numerical simulations in powder handling processes. In the latter half of this paper deals with the introduction of achievement of numerical simulations in our laboratory. In the last decade, we have intensively conducted different kinds of numerical simulations in powder handling processes. Here, numerical simulations regarding granular flows in fluidized bed process, mixing, granulation and kneading in high shear mixer, mechanism of electrostatic charge and analysis of granular flow in pneumatic transportation are introduced. Also, a novel simulation method to elucidate mechanism of particle breakage in dry impact milling and practical methods for design of powder handling equipment and scale-up in high shear mixer granulation are described.

Keywords: granular flow, powder handling process, discrete element method, computational fluid dynamics