
PREDICTION OF FLOWABILITY OF COHESIVE AND NON-COHESIVE POWDER MIXTURES AT HIGH STRAIN RATE CONDITIONS BY DISCRETE ELEMENT METHOD

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Abstract

Flow behaviour of the powders play an important role on defining their performance in many industries such as chemical, pharmaceutical and food. To this date, there has been limited number of attempts on predicting the flow behaviour of powder mixtures at high strain rate conditions. In this study, we present our work on prediction of flowability of binary mixtures under dynamic conditions using Discrete Element Method analysis of Freeman FT4 rheometer. It is found that granular bond number, which is the ratio inter-particle adhesion force to gravitational force correlates well with the flow energy measured by Freeman FT4 rheometer for binary mixtures. Three averaging methods are used to calculate the mixture bond number by introducing a weighing factor based on fractional surface area of each component in the mixture. The granular mixture bond number is varied by modifying interfacial surface energy, density and size of each mixture components. The outcome of this study can be used to expand its applicability of multi-component mixtures.

Keywords: Cohesive Powders, Granular Bond number, Freeman FT4, Formulation, Prediction, Powder flowability, Distinct Element Method, DEM

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