AN APPROACH TO DEM MATERIAL CHARACTERIZATION IN COHESIVE GRANULAR BULK SOLID MATERIALS

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ABSTRACT

In bulk handling applications, such as conveying and storage, understanding the DEM particle characteristics to best simulate the flow of particulate systems at the macroscopic scale addresses an uncertainty in the DEM simulation of operational unit design and handling scenarios. This research provides a better understanding of the role adequate DEM material properties have on the flow-ability of bulk solid materials through the development, implementation and application of a generic material model procedure used in developing DEM input properties from physical testing data.

This investigation proposes coupling physical material testing procedures with a DEM history dependent particle-particle macroscopic elasto-plastic adhesive contact model that accounts for both elastic and plastic contact deformations and cohesive attractions [1, 2]. The research application tasks are focused on three major areas: 1) measure a bulk solid's cohesive and frictional properties under mass flow and pressure, 2) simulate each material sample through a series of test controlled standards, 3) verify the suitable predicted material properties in the test applications simulate and are comparable to experimental results.

The DEM particle characteristics of copper ore in a transfer system were simulated to observe the mechanical behavior and plugging potential of the material. The resulting DEM particle characteristic test simulations displayed suitable material inputs used in the simulation of the cohesive flow of physical copper ore material. As part of physical testing, such simulations can be used as part of the optimization for bulk handling design and operation.

REFERENCES

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[2] L. Del Cid (2015). A Discrete Element Methodology for the Analysis of Cohesive Granular Bulk Solid Materials (Doctoral dissertation). Colorado School of Mines.