

عنوان مقاله:

Accuracy of Discrete Element Method Simulations: Rolling and Sliding Frictions Effects-Case study: Iron Ore Pellets

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خلاصه مقاله:

The discrete element method (DEM) has been used as a popular simulation method in order to verify the designs by visualizing how materials flow through complex equipment geometries. Although DEM simulation is a powerful design tool, finding a DEM model that includes all real material properties is not computationally feasible. In order to obtain more realistic results, particle energy loss due to rolling friction has been highlighted by many researchers using various models to implement a reverse torque. On account of the complexity of the problem, there is no unique model for all applications (i.e. dynamic and pseudo-static regimes). In this research work, an in-house developed DEM software (KMPCDEM©) was used to assess the robustness of three models by comparing the repose angle obtained through the draw down test. The elastic-plastic spring dashpot model was then modified based on considering the individual parameters instead of the relative parameters of two contact entities. The results showed that the modified model could produce a higher repose angle. The modified model was used for the calibration of DEM input parameters in the simulation of repose angle of iron ore pellets in a laboratory setup of the draw down test. Comparison of the calibrated DEM simulation (using 0.0007 and 0.75 for the rolling and sliding friction coefficients, respectively) with the laboratory results showed a good agreement between the predicted and measured angle of repose. The non-calibrated DEM simulations are susceptible to error, and therefore, it is strongly recommended to use the laboratory experiments to characterize the materials before using the DEM simulation as a design tool of industrial equipment.

کلمات کلیدی:

DEM, Contact parameters, Repose angle, Calibration, Iron ore pellets

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