The Effect of Coefficient of Friction on Granular Mixing by Using Discrete Element Method (DEM).

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Mixing of granular material as a field of technology is widely used in behalf of granular structure of materials in the pharmaceutical (preparation of drugs), chemical (reactors), food (lyophilisation) and civil engineering (compacted concrete) industry etc. Many challenges persist in the analysis and efficient computation for various problems of the granular flow. The main aim of this research is to describe the influence of the coefficient of friction on the mixing process within the granular system and its dynamics. The mixing process was studied with varying coefficient of friction (from 0.05 to 0.9) and blade rotational speed (from 15 to 540 rpm). The simulation is conducted by using open-source code LIGGGHTS based on Discrete Element Method. The mixing process of approximately 42 thousand spherical particles with a 2mm diameter is simulated in a vertical cylindrical mixer with two opposed flat blades. The rake angle of blades is 45°. With increasing coefficient of friction the tangential motion is slower, radial and axial movement growth. Increasing coefficient of friction also supports the formation of secondary flow (recirculation) and reduces the rotation period of these recirculations. These features support the homogenization.

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