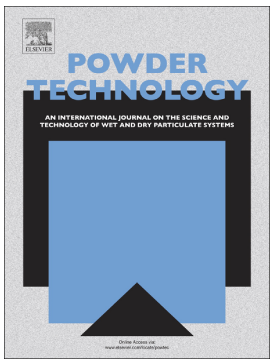

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DEM investigation of the axial dispersion behavior of a binary mixture in the rotating drum

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Abstract

The granular motion of binary-size mixture in a three-dimensional rotating drum operating in the rolling regime is numerically tracked via the discrete element method (DEM), with a focus on the axial dispersion behavior of the different particle types in response to the inherent size-segregation. Accordingly, the evolution with time, the frequency distribution and the space-time profiles of the axial dispersion coefficients are evaluated. The results demonstrate that (i) the fast radial segregation gives rise to the sharp increase and decrease of the axial dispersion coefficients of respectively the large and small particles in both the active and passive regions; (ii) the axial dispersion coefficients in the active region is an order-of-magnitude higher than that in the passive region; (iii) after the radial segregation, the frequency distributions of the axial dispersion coefficients of the large particles, the small particles and all the particles are normal distributions; (iv) the greatest axial dispersion coefficients of both particle types are at the upper part of the active region near the bed surface; (v) increasing the rotating speed and particle