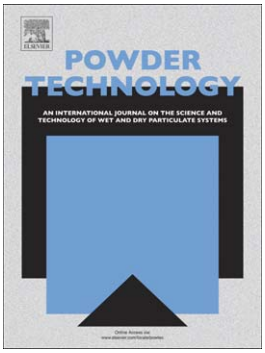

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EFFECTS OF THE GEOMETRY OF FINE POWDER OUTLET ON PRESSURE DROP AND SEPARATION PERFORMANCES FOR DYNAMIC SEPARATORS

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Abstract

The performance of a dynamic separator installed in the cement industry with different conceptions of fine collection outlets, was evaluated using the FLUENT software. One cylinder shaped and four tangential shaped fine exit tubes were designed to compare the behavior of the flow field of various geometries of air classifiers. Turbulence closure is affected by employing the Reynolds Stress Model which takes into consideration the effects of swirl, rotation and high complex three-dimensional flows. The discrete phase model was used to predict the effect of the geometry of the outlet on the collection efficiency and the fish-hook effect. It is found that the modified structure have a great impact on the velocity and pressure fields. The simulation results indicate that the tangential and the axial velocities are hardly influenced by the modified structure of the fine powder geometry. The findings also suggest that the large radial velocity gradients in the axial region as well as in the areas between the rotor blades would cause the return of the fine particles to the annular region to be mixed again with the coarse powder. This phenomenon is more marked for A type of the separator and leads to a higher fish-hook effect in the selectivity curve. But in simulation, reducing the number of the fine powder exits can decrease greatly the computing memory and time.

Keywords: Dynamic separator, CFD simulation, selectivity curve, fish-hook effect

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