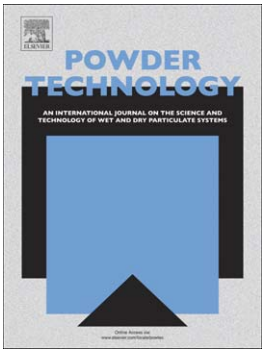

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M.V.C. Machado, S.M. Nascimento, C.R. Duarte, M.A.S. Barrozo

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Boundary conditions effects on the particle dynamic flow in a rotary drum with a single flight

M.V.C. Machado, S.M. Nascimento, C.R. Duarte and M.A.S. Barrozo*

School of Chemical Engineering, Federal University of Uberlândia, Bloco K, Campus Santa Mônica, 38400-902, Uberlandia, MG, Brazil

Abstract

This study presents an experimental and numerical investigation of the particle dynamic flow in a rotary drum with one flight, under different boundary conditions. The Euler-Euler approach with the kinetic theory of granular flow was used for all CFD simulations. The influence of different specularity coefficient values and no-slip boundary condition was assessed varying the particle-particle restitution coefficient and the rotational speeds. The particle-particle restitution coefficient of glass beads was experimentally measured and the effect of this parameter on the particle dynamics was also investigated. A high-speed video camera was used to measure the flight unloading profile and the bed height of particles in rolling regime at the drum bottom. Quantitative and qualitative analysis were performed in order to compare the simulated results with the experimental data, and then to determine the appropriate parameters to represent the real particle flow. It was observed that the specularity coefficient value of 0.5 and the restitution coefficient of 0.9 represented well the particle flow behavior in the flight at the rolling regime for the different rotational speeds analyzed.

Keywords: rotary drum, boundary conditions, fluid dynamics

*Author to whom any correspondence should be addressed

Fax: 55-34-32394188 - e-mail: masbarrozo@ufu.br