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Analysis on Pneumatic Conveying of Solids in Horizontal Lines

Especially on the Motion of Particles under the Small Solid Concentration

Masanobu MAEDA （前 田 昌 信）

This work deals with analyses on pneumatic conveying of solids in horizontal lines under the small solid concentration, considering the motion of particles in the pipe. The analyses are made from the point of microscopic view, setting the model of mean skip length of solid particles.

The direct determinations of particle velocity are made, using a combination of a rotating shutter and photogrphic measurements of particle trajectories. From these results the slip velocity between solids and air flow is obtained and the mean skip lenghth is calculated, considering momentum losses by collisions of particles to the wall.

This analytical method is applied concretely to the analyses for the dependence of the slip velocity on the diameter of pipes and the transport air velocity in the horizontal straight line, in the horizontal rectangular blanch lines, in the divergent pipes and in the bent lines.

In the consequence of these analyses a lot of experimental results which are hitherto known and are newly derived in this work is clearly explained and it is confirmed that the velocity and the pressure losses in transport lines are well pre-scribed with the model of mean skip length of particles suggested in this work.