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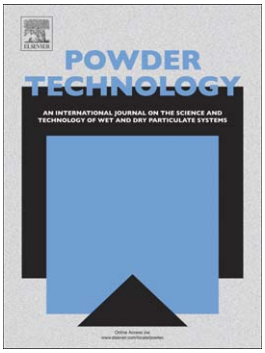

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ACCELERATION PRESSURE DROP ANALYSIS IN HORIZONTAL DILUTE PHASE PNEUMATIC CONVEYING SYSTEM

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ABSTRACT

In pneumatic conveying pipelines, there are specific periods and distances where particles start to accelerate or deaccelerate from specific velocity to steady state. This phenomenon attributes an additional loss of energy also invoke as acceleration pressure drop. The total acceleration pressure drop is defined by measuring the pressure difference between two points at the acceleration zone. The pressure drop of steady state flow for the same length is then reduced from the previous measurement to find acceleration only energy loss. Theoretical equation of momentum change, a material physics, has used to explain the acceleration pressure drop in horizontal pipe. Experimental results have compared with the values of theoretical equation. Results indicated that predicted pressure drop is deviating from the experimental results. Hence, the problem was realized that there was need to precisely predict steady state (collision and friction) pressure drop in this zone, which in classical way of prediction would be used to do just by extrapolation up to the acceleration zone. Hence, a novel factor α has derived by the authors to accurately predict steady state loss in this zone. Experiments have conducted by using different kinds of materials (Bottom ash, Glass be ads, Semolina etc.) at different conveying conditions. To view point of design engineers, contribution of acceleration pressure drop in total pipeline has demonstrated by comparing 10m and 100m long horizontal pipe. To a simplest case of conveying criteria, acceleration loss contribute 25% of total pipeline pressure drop for 10m pipe and it reduced to 4% for 100m pipeline.

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