

Usta BA, M.Eng., "Pressure Differences and Pressure Fluctuations in Downers", The University of Western Ontario, September 1995 (co-supervised, JM Beeckmans as chief advisor).

Abstract

The present work was undertaken to evaluate the effects of solids flux and gas velocity on pressure drop, pressure fluctuation and solids holdup in cocurrent downflow gas-solids flows.

Experiments were conducted with 189 μm sand particles in a 3.2 cm diameter galvanized iron tube. The pressure gradient was positive and increased within the range of solids flux studied in this research (152-192 $\text{kg/m}^2\text{s}$) but decreased with the gas velocity (5-7 m/s).

Solids holdup increased linearly with solids flux but decreased with gas velocity. The slip velocity was higher than the calculated single particle terminal velocity. The gas-wall frictional pressure drop was consistent with that calculated from the Blasius equation. The solids-wall frictional pressure drop was compared with the correlation from Yang (1978) and the deviation ranged between 65% and 300%.

The standard deviation of the differential pressure fluctuations increased with the distance between the pressure taps. The standard deviation of the pressure fluctuations was influenced by solids flux and gas velocity.