

The Lockhart-Martinelli Correlation is a Reliable Tool for Estimating the Pressure Gradient of Three Phase Flows in Horizontal Pipes

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In this study three phase pressure gradient was estimated using the classical Lockhart-Martinelli's pressure gradient correlation. It was observed the Lockhart-Martinelli's pressure gradient correlation can reliably predict three phase pressure gradient if the three phase gas-liquid-solid phases are considered as two phase flow of homogeneous slurry (liquid-solid) phase and gas phase. The predicted pressure gradients by the Lockhart-Martinelli correlation were also compared with the experimental data in the literature. A reasonable agreement was found between the correlation data and experimental data. It was also found the Lockhart-Martinelli's pressure gradient correlation can reasonably estimate three phase pressure gradient compared to the other classical correlations such as Beggs and Brill correlation (1973) and Dukler correlation (1964). However, the Lockhart-Martinelli's correlation fails to predict the pressure gradient in case of smaller pipes of less than 10 mm I.D., where the pipe wall has dominant effects on three phase flow properties. This study will assist in finding a reliable tool for estimating pressure gradient in three phase flows and will assist in many industrial designs where the knowledge of pressure gradient is an utmost important factor.