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Experimental investigation of pressure drop for gas/shear thinning fluid flows in a horizontal pipe

The objective of the study focuses on gas/non-Newtonian liquid horizontal flow in a pipeline. The gas and the liquid flow rates were varied over a wide range of flow conditions. The flow rate of the non-Newtonian liquid ranged from 0.023 to 0.115 m^3/s, while that of the gas ranged from 0.023 to 0.160 m^3. The experiment was conducted to determine the pressure drop using a transparent pipe of 76.2 mm diameter and 2.44 m long horizontal pipe. Xanthan gum solution was used to simulate non-Newtonian fluid. The pressure drop gradient model of Lockhart-Martinelli as modified for gas/shear thinning fluid flow. The theoretical predictions of pressure loss were compared with the experimental data for air/shear thinning fluid flow results. From the experimental work, it was observed that the pressure drop was directly proportional to the concentration of Xanthan gum (shear thinning fluid). The flow regimes of bubbly, slug, plug and wavy flow were also captured by a high-speed camera.

Biography

M A Rahman has background in multiphase flow experiments; and CFD of both academic (fundamental) and industrial (applied) research contributions have been documented in more than 50 refereed journals and conference proceedings. In recognition of his high-quality research endeavors, he has been awarded several multimillion-dollar grants from organizations such as the Natural Sciences and Engineering Research Council of Canada and Newfoundland Research & Development Corp. He has been involved in a number of research collaborations with companies, including Intecsea, Husky Energy, Syncrude Canada, GRI simulations, C-Core and Coanda Research & Development Corp. He was a Postdoctoral fellow in 2012 in the School of Mining and Petroleum Engineering at the University of Alberta. He also worked as a Postdoctoral fellow in 2011 in the Department of Chemical and Materials Engineering at the University of Alberta. He earned his PhD from the University of Alberta in 2010 and his Master's degree from Dalhousie University (Canada) in 2004. He has successfully supervised a number of postdoctoral fellows, graduate students, research associates and undergraduate students. He is the recipient of a Best Teaching Award from the University of Alberta in 2009. He is also involved with a number of professional organizations, including SPE, ASME and CSME. He is a registered Profession Engineer in Alberta, Canada.

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