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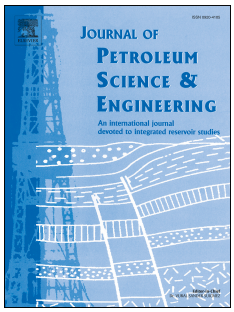

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Raymond A. Eghorieta, Tolani A. Afolabi, Ekarit Panacharoensawad

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Drift flux modeling of transient high-viscosity-liquid and gas two-phase flow in horizontal pipes

Raymond A Eghorieta, Tolani A. Afolabi, Ekarit Panacharoensawad*

Bob L. Herd Department of Petroleum Engineering, Texas Tech University, 807 Boston Avenue, Box 43111, Lubbock, TX 79409, USA

Abstract

The drift flux model was develop by using two mass conservation equation, a single mixture momentum equation, an algebraic slip relationship, and the new closure relationship for the drift velocity for the case of air and high-viscosity-oil in horizontal and near horizontal pipe. The Finite Volume Method (FVM) with staggered grid system was employed. The flux-splitting scheme was used for discretizing the flux term. The explicit Euler method with the consideration of Courant number. The model was solved using a hybrid shock capturing scheme often used for gas dynamics. Totally 31 transient cases were simulated and compared with the transient experimental result of air and high-viscosity oil data. It is the first time in this study to show that the drift flux model is capable of predicting the transient hydrodynamics of the air and high-viscosity oil cases. This model performed reasonably well with average relative error of 13.55% (Standard Deviation of 11.62%) with respect to experimental results.

Introduction

Gas-liquid Two-phase flow in pipe is an intrinsic component of many engineering systems that requires predictability and optimal design. These engineering systems include the design of cooling system for nuclear reactor, the design of flow line in refinery and brewing plant, and the