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Foam Generation, Characterization and Breakup in Pipes

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Foam Generation, Foam Flow, Generation Device, Foam Stability, Foam Quality, Foam Flow Patterns

1. Abstract

Experiments were conducted utilizing a 0.025 m diameter Foam Characterization Rig (FCR) skid. Aqueous foam was used in the experimental program, utilizing both Drill Foam F-450 and SI-403 surfactants to generate the foam. Foam generation and characterization experiments were conducted with different foam generation devices, with the aim of identifying the optimal configuration, which generates the most stable foam. A comparison between the foam quality and inlet gas volume fraction (IGVF) demonstrates that these variables are close to each other at 90% IGVF ($v_{sg} = 0.09$ m/s) owing to the occurrence of homogenous flow for this condition. The data also confirm that the foam generation configuration with two 125 μm mesh size and 3 mm beads generates the most stable foam.

Three different flow patterns were observed in the pipe, namely, stratified, dispersed and slug flow, exhibiting different foam quality. Foam flow in pipes experiments revealed that the gas shear effect on foam break-up depends on the existing flow pattern in the pipe. For stratified wavy flow, increasing the superficial gas velocity can lead to either increasing or decreasing foam breakup efficiency, which depends on the gas

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