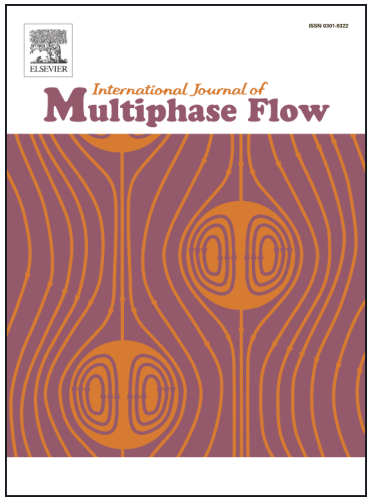

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Abstract

Experimental investigation of the effects of drag-reducing polymer on oil-water flow patterns, pressure drops, phase inversion and slip ratio in a horizontal acrylic pipe of 30.6-mm ID was carried out. The polymer which is a water-soluble, high-molecular-weight anionic copolymer of polyacrylamide and 2-Acrylamido-2-Methylpropane Sulfonic acid (AMPS) was prepared in 2000 ppm master solution and injected at controlled flow rates to provide 40 ppm of the polymer in the water phase. In the flow conditions of 0.1 – 1.6 m/s mixture velocity and 0.05 – 0.9 input oil volume fractions investigated, the addition of the polymer affected the flow characteristics especially at lower mixture velocities and input oil volume fractions. The stratified, dual continuous and dispersed oil in water and water layer flow patterns were extended to higher mixture velocities but the oil-continuous flow patterns were not affected by the addition of the polymer. There were significant reductions in the pressure drops after the addition of the polymer mainly in water-dominated flow regions and these reductions increased with increase in the mixture velocity and decrease in the input oil volume fraction, leading to maximum drag reduction of about 64 % at the highest mixture velocity and at 0.05 input oil volume fraction. Again, the addition of the polymer eliminated or shifted the sharp increases in the pressure drops at the phase inversion points towards higher input oil volume fractions. Finally, the addition of the polymer increased the slip velocity ratios especially at lower mixture velocities.

Key words: Oil-water; Pressure gradients; Drag reductions; Flow patterns; Holdups; slip ratios