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Effect of Non-Newtonian Behavior of Oil Phase on Oil-Water Stratified Flow in a Horizontal Channel

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Abstract : The present work focuses on the investigation of the effect of non-Newtonian behavior on the oil-water stratified flow in a horizontal channel using ANSYS Fluent. Coupled level set and volume of fluid (CLSVOF) has been used to capture the evolving interface assuming unsteady, coaxial flow with constant fluid properties. The diametric variation of oil volume fraction, mixture velocity, total pressure and pressure gradient has been studied. Non-Newtonian behavior of oil has been represented by the power law model in order to investigate the effect of flow behavior index. Stratified flow pattern tends to assume dispersed flow pattern with the change in the behavior of oil to non-Newtonian. The pressure gradient is found to be very much sensitive to the flow behavior index. The findings could be useful in designing the transportation pipe line in petroleum industries.

Keywords : oil-water stratified flow, horizontal channel, CLSVOF, non–Newtonian behaviour.
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