

[Keynote Speech]: Experimental Study on the Effects of Water-in-Oil Emulsions to the Pressure Drop in Pipeline Flow

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Abstract : Emulsion formation is unavoidable and can be detrimental to an oil field production. The presence of stable emulsions also reduces the quality of crude oil and causes more problems in the downstream refinery operations, such as corrosion and pipeline pressure drop. Hence, it is important to know the effects of emulsions in the pipeline. Light crude oil was used for the continuous phase in the W/O emulsions where the emulsions pass through a flow loop to test the pressure drop across the pipeline. The results obtained shows that pressure drop increases as water cut is increased until it peaks at the phase inversion of the W/O emulsion between 30% to 40% water cut. Emulsions produced by gradual constrictions show a lower stability as compared to sudden constrictions. Lower stability of emulsions in gradual constriction has the higher influence of pressure drop compared to a sudden sharp decrease in diameter in sudden constriction. Generally, sudden constriction experiences pressure drop of 0.013% to 0.067% higher than gradual constriction of the same ratio. Lower constriction ratio cases cause larger pressure drop ranging from 0.061% to 0.241%. Considering the higher profitability in lower emulsion stability and lower pressure drop at the developed flow region of different constrictions, an optimum design of constriction is found to be gradual constriction with a ratio of 0.5.

Keywords : constriction, pressure drop, turbulence, water-in-oil emulsions

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