

## عنوان مقاله:

Computational Fluid Dynamics (CFD) Analysis of Flow Characteristics of Heavy Crude Oil-in-Water Emulsion through Pipelines

## محل انتشار:

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## خلاصه مقاله:

Heavy crude oil is a highly viscous fluid with API gravity less than 22.30. These properties of heavy crude make their transportation through pipelines complicated and challenging. A huge pressure drop is observed during the transportation of heavy oil through pipelines. This article addresses this complication by preparing a surfactant stabilized heavy crude oil-in-water (O/W) emulsion with reduced viscosity for ease of flow through pipelines. Different O/W emulsion samples were prepared with varying concentrations of an anionic surfactant, Linear alkylbenzene sulphonic acid (LABSA), to achieve an optimized formulation based on rheological and stability studies. The optimized emulsion was further considered to simulate and analyze the flow characteristics (static pressure drops and velocity profiles) across the horizontal pipeline using a computational fluid dynamics (CFD) approach. The CFD study was performed for three different inner diameters of the pipeline (5.9, 16, and 24 in.) and three different inlet velocities (0.1, 0.5, and 1.0 m/s). The results suggested that the static pressure drop across the pipeline decreased with the increase in the diameter of the pipeline at constant inlet velocity. For a pipe diameter of 24 in. and inlet velocity of 0.1 m/s, the pressure drop across the pipeline was reduced significantly by an order of three for O/W emulsion when compared to that of heavy crude oil. It is also observed that pressure drop increases with increase in the inlet velocity for a given pipeline of constant inner diameter.

## کلمات کلیدی:

.Heavy Crude Oil; Pipeline Transportation; Oil-in-Water emulsion; Computational Fluid Dynamics; CFD

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