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Prediction of sand kinematic pressure and fluid-particle interaction coefficient as means of preventing sand-induced corrosion in crude oil pipelines

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ABSTRACT

Sand-induced corrosion and scaling of petroleum pipes is a serious situation that barely knows any solution by conventional or new methods of corrosion control. This is because, the mechanism behind sand corrosion and scaling of petroleum pipes is yet to be unravelled. Rather than avoid the situation, the integration of sand filters in petroleum lines also contribute to the problem. In this work, a three phase model was used to simulate upstream flow conditions where sand is produced alongside water and crude oil. The effects of fluid-particle interaction coefficient/forces and sand kinematic pressure, in relation to conditions that favour sand deposition, corrosion and scaling of petroleum pipes were determined. Based on the results, on a 2-3 h basis, periodic checks need be conducted at the 12-18 m points where sand kinematic pressures and interaction coefficients of the components require flow adjustments in order to avoid situations leading to pipeline wear.

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