Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Numerical simulations of crude-oil fouling[1] JUNFENG YANG, OMAR MATAR, Imperial College London — Crude-oil fouling proceeds via several individual steps: initiation, transportation, attachment, removal and ageing. At initiation, two foulant formation routes have been identified: chemical reaction and asphaltene precipitation. Current fouling models either focus on the kinetics of each route individually, or simply lumps the routes together. Very few studies address the issue of interaction of the two routes. The sparingly-soluble foulant precursor could either form larger insoluble fouling particles, or precipitate out of the crude-oil phase directly. Clearly, these two routes compete with each other, e.g. higher chemical reaction fouling rates lead to greater consumption of the sparingly-soluble foulant, and lower precipitation rate. Accounting for the mechanism of interaction between reaction- and precipitation-driven fouling is critical for accurate prediction of the overall fouling formation rate, and the development of fouling mitigation strategies. We develop CFD tools that account for the individual steps that accompany fouling in circular tubes, and use large eddy simulations to simulate turbulence. We use our simulations to elucidate the interaction between the different deposition routes.

[1]Skolkovo Foundation through the UNIHEAT Project

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Date submitted: 26 Jul 2014 Electronic form version 1.4