

Abstract Submitted  
for the DFD13 Meeting of  
The American Physical Society

**Numerical simulations of fouling in crude-oil processing**<sup>1</sup> JUN-FENG YANG, OMAR MATAR, Imperial College London — The aims of this study are to achieve fundamental understanding of the transfer processes underlying the development of a fouling layer on the inside of heat exchangers used in crude-oil processing. The numerical models developed are based on the solution of the mass and momentum conservation equations, coupled to the energy transport equation. These are complemented by relations that capture the dependence of the layer density, viscosity, and surface tension on temperature. In order to capture ageing effects, the thermal conductivity of the layer is allowed to depend on temperature, and a functional form is chosen for its viscosity that accounts for dynamic structure-building and destruction. Importantly, a chemical equilibria model is used to model the phase behaviour of the oil, and this is also coupled to the governing equations. The turbulence in the fluid phase is modelled using large eddy simulations. Numerical solutions of the model equations are obtained in a channel geometry using a volume-of-fluid approach. Our results capture the complex fouling dynamics that include phase separation, wall-layer deposition, and removal.

<sup>1</sup>Skolkovo Foundation, UNIHEAT project

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Date submitted: 27 Jul 2013

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