

Abstract Submitted  
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**A hybrid interface tracking-level set technique for multiphase flow with soluble surfactant in Blue**<sup>1</sup> OMAR K. MATAR, Imperial College London, SEUNGWON SHIN, Hongik University, Korea, JALEL CHERGUI, DAMIR JURIC, LIMSI, CNRS, LYES KAHOUADJI, RICHARD V. CRASTER, Imperial College London — We adapt a formulation for surfactant transport in multiphase flows presented by Muradoglu & Tryggvason (JCP 274 (2014) 737-757) to the context of the Level Contour Reconstruction Method (Shin *et al.* IJNMF 60 (2009) 753-778), a hybrid method that combines the front-tracking and level-set methods. Attention is paid to the formulation and numerical implementation of the surface gradients of surfactant concentration and surface tension. Various benchmark tests are performed to demonstrate the accuracy of different elements of the algorithm. To verify surfactant mass conservation, values for surfactant diffusion along the interface are compared with the exact solution for the problem of uniform expansion of a sphere. The numerical implementation of the discontinuous boundary condition for the source term in the bulk concentration is compared with the approximate solution. Surface tension forces are tested for Marangoni drop translation. Our numerical results for drop deformation in simple shear are compared with previous experimental and numerical results yielding good agreement. We also demonstrate that our approach applies easily to massively-parallel simulations.

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