

Abstract Submitted
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Multi-scale simulations of droplets in generic time-dependent flows¹ FELIX MILAN, University of Rome Tor Vergata / Eindhoven University of Technology, LUCA BIFERALE, MAURO SBRAGAGLIA, University of Rome Tor Vergata, FEDERICO TOSCHI, Eindhoven University of Technology — We study the deformation and dynamics of droplets in time-dependent flows using a diffuse interface model for two immiscible fluids. The numerical simulations are at first benchmarked against analytical results of steady droplet deformation, and further extended to the more interesting case of time-dependent flows. The results of these time-dependent numerical simulations are compared against analytical models available in the literature, which assume the droplet shape to be an ellipsoid at all times, with time-dependent major and minor axis. In particular we investigate the time-dependent deformation of a confined droplet in an oscillating Couette flow for the entire capillary range until droplet break-up. In this way these multi component simulations prove to be a useful tool to establish from "first principles" the dynamics of droplets in complex flows involving multiple scales.

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