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MULTIPHASE FLOWS IN MICROFLUIDIC APPLICATIONS: DROPLET DYNAMICS, WETTING, AND TRANSPORT IN COMPLEX MEDIA

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ABSTRACT

Phenomena associated with multiphase (liquid-gas) flow have been actively studied for decades due to their presence in numerous practical applications that involve droplet dynamics, liquid jets, and oil-gas/water transport in porous media, to name just a few. In most of such cases, the liquid-gas system forms a contact-line with the solid surfaces. Tending to reach its equilibrium configuration, the three-phase system exhibits a dynamic behavior, which is particularly determined by its physicochemical properties. The involved phenomena can be treated at different scales using the pre-developed models or directly incorporated by employing a multi-scale numerical method.

This session aims at bringing together researchers working on different aspects of the modeling of the multiphase flow in various microfluidic applications. The approaches of interest include microscopic and mesoscopic ones (like molecular dynamics and the Lattice-Boltzmann method, respectively) as well as continuum-level modeling using simplified and high-fidelity CFD. Efficient algorithms applied to the modeling of transport phenomena in complex (porous) media are also welcome.