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Simulation of Taylor bubble flow in T-shaped micro-channel by MPS method SHAOSHAN RONG, BIN CHEN, Xi'an Jiaotong University, KEY LAB. OF MULTI-PHASE FLOW IN POWER ENGINEERING TEAM — Moving Particle Semi-implicit (MPS) method uses particles and their interactions to simulate incompressible flow and it is a promising meshless method for multiphase flow simulation. In order to capture the interface in micro-scale channel, Taylor bubble flow in a T-shaped micro-channel is simulated in this paper. Firstly available surface tension and wettability model are improved and validated by simulating the droplet vibration and static shapes of a droplet attached on the solid surface, respectively. Afterwards, by discretizing the liquid and gas phases into moving particles with different density, bubble slug generation in T-shaped micro-channel is reproduced by MPS method with above models. The good agreement between numerical simulation with visualization experiment confirmed the capacity of MPS for the micro-scale two-phase flow. Finally, bubble generation mechanism is revealed by the velocity field of typical squeezing and shearing regime. The influences of viscosity, surface tension and contact angle on the bubble slug length are also discussed in detail.

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