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Microbubbly Taylor-Couette Flow KAZUYASU SUGIYAMA, ENRICO CALZAVARINI, DETLEF LOHSE, University of Twente (The Netherlands)
— Direct numerical simulations of the microbubbly Taylor-Couette flow are presented, employing the point-particle approach and two-way coupling. The Reynolds number is between 600 and 2500. The addition of bubbles results in a strong torque and therefore drag reduction. The simulation results are consistent with the experimental data of Murai et al. (2005, J. Phys. Conf. Ser., **14**). To reveal the physical mechanism of the drag reduction, we investigate the energy transport balance among the energy dissipation and the energy inputs via the torque and the rising bubbles. Our analysis suggests that the torque reduction is caused by the appearance of an axial flow, induced by rising bubbles, that is able to break the energy-dissipative vortices. Although this effect is in principle similar to that produced by an axial driving force in a single phase flow, we demonstrate that the bubble addition is more efficient in reducing the torque.

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