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Bubbly flows around a two-dimensional circular cylinder[1]
JUBEOM LEE, HYUNGMIN PARK, Seoul National University — Two-phase cross flows around a bluff body occur in many thermal-fluid systems like steam generators, heat exchangers and nuclear reactors. However, our current knowledge on the interactions among bubbles, bubble-induced flows and the bluff body are limited. In the present study, the gas-liquid bubbly flows around a solid circular cylinder are experimentally investigated while varying the mean void fraction from 5 to 27 %. The surrounding liquid (water) is initially static and the liquid flow is only induced by the air bubbles. For the measurements, we use the high-speed two-phase particle image velocimetry techniques. First, depending on the mean void fraction, two regimes are classified with different preferential concentration of bubbles in the cylinder wake, which are explained in terms of hydrodynamic force balances acting on rising bubbles. Second, the differences between the two-phase and single-phase flows (while matching their Reynolds numbers) around a circular cylinder will be discussed in relation to effects of bubble dynamics and the bubble-induced turbulence on the cylinder wake.

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