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Experimental study on wake structure of single rising clean bubble AYAKA SATO, YUTA TAKEDOMI, Kyushu University, MINORI SHIROTA, National Institute of Advanced Industrial Science and Technology, TOSHIYUKI SANADA, Shizuoka University, MASAO WATANABE, Kyushu University — Wake structure of clean bubble rising in quiescent silicone oil solution of photochromic dye is experimentally studied. A single bubble is generated, immediately after UV sheet light illuminates the part of the liquid just above the bubble generation nozzle in order to activate photochromic dye. Once the bubble passes across the colored part of the liquid, the bubble is accompanied by some portion of activated dye tracers; hence the flow structure in the rear of the single rising bubble is visualized. We capture stereo images of both wake structure and bubble motion. We study how wake structure changes with the increase in bubble size. We observe the stable axisymmetric wake structure, which is called 'standing eddy' when bubble size is relatively small, and then wake structure becomes unstable and starts to oscillate with the increase in bubble size. With further increase in bubble size, a pair of streamwise vortices, which is called 'double thread', is observed. We discuss in detail this transition from the steady wake to unsteady wake structure, especially double thread wake development and hairpin vortices shedding, in relation to the transition from rectilinear to spiral or zigzag bubble motions.

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