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Bubbly flow in upward 90-degree elbow pipe: bubble dispersion and liquid flow structure[1] HONGSEOK CHOI, HYUNGMIN PARK, Seoul National University — In gas-liquid 2-phase flows, interfacial structure plays an important role in determining the transport characteristics, which changes with geometry and inlet condition. We experimentally investigate change in bubble dynamics and flow structures for gas-liquid bubbly flow in 90-degree bent square pipe, varying mean void fraction up to 3.0%. Continuous phase flows are chosen as laminar (Re = 550) and turbulent flows (Re = 7,000). We acquire the liquid-phase velocity using two-phase PIV technique, while gas-phase velocity and size distribution are measured with high-speed shadowgraphy. In laminar flow, bubbles move much faster than the liquid phase, resulting in a backflow and large recirculation region at the inner wall of the pipe. The size of this region increases with mean void fraction, inducing strong turbulence at the boundary. For turbulent flow, flow structure doesn't show significant change with considered void fraction, but bubble trajectories move from the inner wall to the outer wall as mean void fraction increases. As a result, location of the maximum liquid-phase turbulence changes accordingly. Analysis of the interfacial force balance and mechanism for flow structure change will be discussed further.

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