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Bubble Size Distribution in a Vibrating Bubble Column SHAHROUZ MOHAGHEGHIAN, TREVOR WILSON, BRET VALENZUELA, TYLER HINDS, KEVIN MOSENI, BRIAN ELBING, Oklahoma State Univ — While vibrating bubble columns have increased the mass transfer between phases, a universal scaling law remains elusive. Attempts to predict mass transfer rates in large industrial scale applications by extrapolating laboratory scale models have failed. In a stationary bubble column, mass transfer is a function of phase interfacial area (PIA), while PIA is determined based on the bubble size distribution (BSD). On the other hand, BSD is influenced by the injection characteristics and liquid phase dynamics and properties. Vibration modifies the BSD by impacting the gas and gas-liquid dynamics. This work uses a vibrating cylindrical bubble column to investigate the effect of gas injection and vibration characteristics on the BSD. The bubble column has a 10 cm diameter and was filled with water to a depth of 90 cm above the tip of the orifice tube injector. BSD was measured using high-speed imaging to determine the projected area of individual bubbles, which the nominal bubble diameter was then calculated assuming spherical bubbles. The BSD dependence on the distance from the injector, injector design (1.6 and 0.8 mm ID), air flow rates (0.5 to 5 lit/min), and vibration conditions (stationary and vibration conditions varying amplitude and frequency) will be presented. In addition to mean data, higher order statistics will also be provided.

Shahrouz Mohagheghian
Oklahoma State Univ

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