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Experimental and numerical study of bubble transport within multiphase cross flow over a cylinder. ERIC THACHER, SIMO MAKIHARJU, University of California, Berkeley — Vortex-induced vibration from cross flow over a cylinder is an important design consideration in numerous applications. For single phase flow, this phenomenon has been studied extensively; however, while past researchers have shown that increasing phase fraction decreases vibration amplitude while increasing shedding frequency, the mechanisms causing these changes are not fully understood. Studying individual bubble transport may provide insight, as indicated by Voutsinas et al. (2009) who demonstrated that the frequency shift depends on bubble size. In this work we begin by studying the flow of individual bubbles over a cylinder in cross-flow, to assess the time needed for bubbles to be captured in the shed vortices. Following the method of Oweis et al. (2005), the capture time is predicted using a point-particle tracking model, as a function of bubble size, release position, and flow rate. The numerical results are then verified experimentally using high speed camera visualization of a cylinder in cross flow within a vertical flow loop. The time-resolved transport of a single stream of monodisperse bubbles from a needle and co-flow apparatus is used to assess the impact of capture time on cylinder pressure fluctuations, before expanding the study to higher void fraction flows. -/abstract- Authors: Eric W. Thacher and Simo A. M

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