Abstract Submitted
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Turbulent hydraulic jumps: characterization of macro and micro bubble generation[1] MILAD MORTAZAVI, ALI MANI, Center for Turbulence Research, Stanford — Bubble generation is a ubiquitous two-phase flow phenomenon occurring constantly in nature and in a wide variety of industrial processes. This work considers a hydraulic jump as a canonical setting to investigate bubble generation by nonlinear breaking waves. We have performed direct numerical simulation of a turbulent hydraulic jump with inlet Froude number of 2.0 and Reynolds number of 11000. We show remarkable similarities in the bubble size distribution and its evolutions between this statistically stationary wave and reported results for transient breaking waves. Additionally, in the hydraulic jump large bubbles are observed to be generated in patch-like structures with a distinct frequency which matches a dominant frequency in the velocity spectrum. It is speculated that this frequency is associated with the roller frequency generated at the toe of the jump. Curvature and relative velocity at the liquid-liquid impact points are investigated as an attempt to model microbubble generation by making connections to the Mesler entrainment mechanism.

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