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Dynamics and Noise Emission of Vortex Cavitation Bubbles in Single and Multiple Vortex Flow STEVEN CECCIO, JAEHYUG CHOI, NATASHA CHANG, RYO YAKUSHIJI, DAVID DOWNLING, The University of Michigan, THE UNIVERSITY OF MICHIGAN TEAM — The growth, splitting, and collapse of single vortex cavitation bubbles were examined experimentally for three flow configurations: a single vortex, a vortex that experiences a pressure drop and recovery as it flows through a Venturi, and a vortex that is stretched through interactions with a second, stronger vortex. The underlying vortical flows were characterized and related to the dynamics and noise emission of the cavitation bubbles. Noise was detected during bubble growth, splitting, and collapse. Highly deformed bubbles produced less noise than equivalent spherical bubbles under similar flow conditions during collapse, and, the noise produced during collapse was often much greater that the noise produced during growth and splitting. While the traditional scaling variables of vortex cavitation ($i.e. \Gamma_O$, r_C, σ_C, $r_{b,M}$) are important parameters that will scale the basic features of the bubble inception, growth, and collapse, the dynamics of vortex cavitation bubbles are not uniquely determined by the non-cavitating vortex properties. Instead, inception, dynamics, and noise production of vortex cavitation bubbles is strongly influenced by the details of the underlying flow field and nuclei distribution. This makes the formulation of general scaling rules problematic.

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