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Dynamics and Noise Emission of Vortex Cavitation Bubbles JAEHYUG CHOI, STEVEN CECCIO, University of Michigan, Ann Arbor — The growth and collapse of a cavitation bubble forming within the core of a line vortex was examined experimentally. A steady line vortex was formed downstream of a hydrofoil mounted in the test section of a recirculating water channel. A focussed pulse of laser light was used to initiate a nulcei in the core of a vortex, allowing for the detailed examination of the growth, splitting and collapse of individual cavitation bubbles as they experience a reduction and recovery of the local static pressure. Images of single bubble dynamics were captured with two pulse-synchronize high-speed video camera. The shape and dynamics of single vortex cavitation bubbles are related to the original vortex properties and the local static pressure in the vortex core, and an analysis was performed to understand the relationship between the non-cavitating vortex properties and the diameter of the elongated cavitation bubble. Acoustic emissions from the bubbles were detected during growing, splitting and collapse, although the acoustic impulse created during collapse was four orders of magnitude higher than the growth and splitting noise. The dynamics and noise generation of the elongated bubbles are compared to that of spherical cavitation bubbles in quiescent flow.

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