Abstract Submitted
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Cavitation onset of an accelerating liquid[1] AKIHITO KIYAMA, Tokyo University of Agriculture and Technology, ZHAO PAN, Utah State University, YOSHIYUKI TAGAWA, Tokyo University of Agriculture and Technology, DAVID DAILY JESSE, Naval Undersea Warfare Center, SCOTT THOMSON, Brigham Young University, RANDY HURD, TADD TRUSCOTT, Utah State University — Accelerating a liquid-filled container can shatter the bottom. High-speed imaging reveals cavitation bubbles collapse near the bottom just before this fracture event. To avoid the damage caused by cavitation, accurate prediction of cavitation onset is crucial. However, the conventional cavitation number, as a function of the mean velocity of the flow does not correctly predict cavitation onset in an accelerating liquid. This study derives an alternative cavitation number from the equation of motion, predicting cavitation as a function of acceleration (cf. Pan & Kiyama et al., Proc. Natl. Acad. Sci., 2017). We have conducted two separate series of experiments with a broad set of varied parameters. All the experimental results agreed with this theory, indicating that the proposed alternative cavitation number describes the universal threshold of cavitation onset within an accelerating liquid.

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