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Axisymmetric, Ventilated Supercavitation in Unsteady, Horizontal Flow ELLISON KAWAKAMI, SEUNG-JAE LEE, ROGER ARNDT, Saint Anthony Falls Laboratory - University of Minnesota — Drag reduction and/or speed augmentation of marine vehicles by means of supercavitation is a topic of great interest. During the initial launch of a supercavitating vehicle, an artificial supercavity is required until the vehicle can reach conditions at which a natural supercavity can be sustained. Previous studies at Saint Anthony Falls Laboratory (SAFL) focused on the behavior of ventilated supercavities in steady horizontal flows. In open waters, vehicles can encounter unsteady flows, especially when traveling under waves. A study has been carried out at SAFL to investigate the effects of unsteady flow on axisymmetric supercavities. An attempt is made to duplicate sea states seen in open waters. In an effort to track cavity dimensions throughout a wave cycle, an automated cavity tracking script has been developed. Using a high speed camera and the proper software, it is possible to synchronize cavity dimensions with pressure measurements taken inside the cavity. Results regarding supercavity shape, ventilation demand, cavitation parameters and closure methods are presented. It was found that flow unsteadiness caused a decrease in the overall length of the supercavity while having only a minimal effect on the maximum diameter. The supercavity volume varied with cavitation number and a possible relationship between the two is being explored. (Supported by ONR)

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