Abstract Submitted
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Influence of scaling effects in the ventilation of surface-piercing bodies[1] FRANCISCO MIGUEL MONTERO, CASEY M. HARWOOD, YIN LU YOUNG, STEVEN L. CECCIO, Dpt. of Naval Architecture and Marine Engineering - U. of Michigan — Ventilation is a process by which atmospheric air is entrained to the submerged portion of a body. The study of this process is of critical importance to the design and control of surface piercing bodies, such as hydrofoils, propellers, struts and turbines, as it can result in a very sudden variation of the forces acting on the body. Ventilation is also influenced by the presence of vaporous cavitation. This cavitation-ventilation process can be complex, and in order to replicate it experimentally, there are several scaling issues that must be carefully considered. The objectives of this work are: (1) to characterize the different ventilation mechanisms, the various parameters that influence the ventilation process, as well as the resultant impact on performance, (2) to discuss and quantify scaling effects in model tests in towing tank and cavitation tunnel studies, and (3) to discuss additional research needs in terms of experimental and numerical modeling. Theoretical arguments, as well as prior and new experimental data, will be used to present the different ventilation mechanisms and derive and illustrate the related scaling issues in both cavitation tunnel and towing tank studies.

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