

Abstract Submitted  
for the DFD19 Meeting of  
The American Physical Society

**Numerical Predictions of Spray Root Location, Hydrodynamic Pressure, and Structural Deformation of a Highly Flexible Deforming Wedge During Vertical Water Entry**<sup>1</sup> JOHN GILBERT, CHRISTINE GILBERT, Virginia Polytechnic Institute and State University — Wave interactions with high-speed planing craft result in repeated slamming events that can lead to equipment failure and serious injury. Our earlier efforts investigated this problem through the use of wedge drop experiments and theoretical predictions, focusing on the effects of linear-elastic structural response on spray root propagation and hydrodynamic pressure. In the current work, predictions from a coupled, non-linear finite element - non-linear boundary value approach are used to extend our previous study to include the effects of large structural deformation. Observations from recent flexible wedge drop experiments conducted at the Virginia Tech Hydroelasticity Laboratory are used to inform the development of the solver. Numerical predictions for spray root location and hydrodynamic pressure as a function of time show good agreement with experiments, while predictions for the structural deformation show discrepancies. This work is part of a larger research effort aimed at understanding this fluid-structure interaction problem.

<sup>1</sup>This project is funded by ONR grant number: N00014-16-1-3188.

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Date submitted: 27 Jul 2019

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