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### **Spray Root Propagation on a Deforming Plate: Applications in Vessel Slamming<sup>1</sup>**

CHRISTINE GILBERT, Virginia Polytechnic Institute and State University

The wedge water entry experiment is used to model slamming of high-speed craft in waves when a vessel becomes partially airborne. This classic experiment in the field of Naval Engineering is well-known and predicted using simple models when the plates of the wedge are rigid. In the current work, flexible plates fabricated from aluminum and composites are examined. The experimental measurements include hydrodynamic pressure on the plate, rigid body motions, structural response, and spray root propagation. Using the information on the location of the spray root and existing theories (such as Wagner 1932 and Vorus 1996), on the 2-D body, it is possible to predict the pressure distribution on the plate using only the location of the spray root. That pressure distribution prediction agrees well with both experimental pressure measurements and a coupled numerical tool developed specifically for the water entry problem. Additionally, it was found that even with structural response, measurements scale very well except in the regime of low drop heights. A hydroelasticity factor,  $R$ , first proposed by Faltinsen 1999, is used to determine regimes when the structural response alters the hydrodynamic loads.

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