

Abstract Submitted
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Water Entry of Flexible Panels: Pressure-Load Estimations from Contact Line Measurements and Theory¹ M. JAVAD JAVAHERIAN, ZHONGSHU REN, CHRISTINE M. GILBERT, Virginia Tech — Wedge water entry is often studied to predict the slamming pressure as a preliminary tool for the design of the high-speed craft. Flexible-bottom panels are of current interest due to lower weight and more widespread use of composite materials in hulls. Since the existing analytical models mostly focus on rigid panels, attention has been drawn to experimental investigations on flexible panels. Mounting pressure sensors to measure the impact loads in experiments for plates with low flexural rigidity increases the panel flexural rigidity. A new technique is presented to estimate the pressure load on the plate using the location of contact line and the existing theoretical models. A set of experiments are conducted for different panels and the contact line is measured with high-speed photography. Modifications have been made to the theoretical models to account for a free-fall entry, consistent with the current experimental setup. The experimental contact line location is then used as an input for these models to estimate the pressure and kinematics of the panel. To validate this method, derived pressure results are compared with experimental measurements for panels with low to moderate flexural rigidities.

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