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Pressure Stagnation Line on a Planing Hull in Calm Water¹ CHRISTINE IKEDA², CAROLYN JUDGE, United States Naval Academy — Highspeed planing boats are subjected to repeat impacts due to slamming, which can cause structural damage and discomfort or injury to passengers. An experimental study aimed at understanding and predicting the physics of a planing craft reentering the water after becoming partially airborne was conducted. A subset of this experiment includes calm water analysis to gain an understanding of the pressure stagnation line and its correlation with the wetted surface on the planning craft in calm water conditions. A planing hull model was towed in a 116-m long, 8-m wide tow-tank with a water depth of 5 m. Hull models at 1/10 and 1/4 of full-scale were examined. These models, only free to move in heave and pitch, were instrumented to measure dynamic pressures with point-pressure sensors at 12 locations near the LCG (longitudinal center of gravity) and transom as well as a highly spatially resolved pressure mapping system. These pressure measurements were sampled at rates up to 20kHz. Using these pressure measurements along with underwater photos of the wetted surface allowed for the v-shaped wetted line and stagnation line to be measured. Preliminary results show that the peak pressures occur before the wetted line and that atmospheric pressure is reached at the transom.

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