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Hydrodynamic forces during the initial stage of body lifting from water surface PATRICIA VEGA-MARTNEZ, JAVIER RODRGUEZ-RODRGUEZ, Carlos III University of Madrid, A KOROBKIN, TATYANA KHABAKHPASHEVA, University of East Anglia — We consider the flow induced by a rigid flat plate, initially touching a horizontal water surface, when it starts to move upwards with constant acceleration. Negative hydrodynamic pressures on the wetted surface of the plate are allowed, thus the water follows the plate due to the resulting suction force. The acceleration of the plate and the plate length are such that gravity, surface tension and viscous effects can be neglected. Under these assumptions, the potential flow caused by the plate lifting is obtained by using the small-time expansion of the velocity potential. This small-time solution fails close to the plate edges, as it predicts there singular velocities and unbounded displacements of the free surface. It is shown that close to the plate edges the flow is non-linear and self-similar in the leading order. This nonlinear flow is computed by the boundary element method combined with a time-marching scheme. We also present the results of an experimental investigation aimed at measuring the hydrodynamic force felt by the plate. This force seems to be very weak, what suggests that cavitation occurs during these initial stages. Supported by the NICOP research grant N62909-13-1-N274, and the Spanish Ministry of Economy and Competitiveness, grant DPI2014-59292-C3-1-P.

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