Abstract Submitted
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The effect of bending stiffness on the impact of flexible plates on a water surface[1] AN WANG, KIT PAN WONG, MIAO YU, KENNETH T. KIGER, JAMES H. DUNCAN, University of Maryland, College Park, UNIVERSITY OF MARYLAND, COLLEGE PARK TEAM — The controlled oblique impact of a series of flexible/rigid rectangular plates (length 108 cm, width 41 cm, pitch angle 10°) on a quiescent water surface is studied experimentally. The flexible plates, which are made of 6061 aluminum, have various thicknesses while the rigid plate structure is made of two aluminum plates stiffened by a light-weight frame glued between them. The mounting structure allows each end of the plate to rotate about a transverse horizontal axis located slightly above the plate. For each plate, the motion trajectory and the impact speed are varied. The plate thickness and impact speed are chosen so that the impact time scale is on the same order of the wet natural period of the plate. The spray formation, the transient impact force, the moment about a horizontal transverse axis, the deflection along the plate's center line and the impact pressure on the plate's lower surface are measured with various techniques. For the same plate, it is found the maximum impact force/moment scale with the square of the component of the impact velocity normal to the undeformed plate. The temporal evolution of impact force and moment arm each have two distinct slopes. The relationship of this behavior to the plate's deformation is explored.

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