



Nonlinear surface wave impact on the bottom

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The problem to compute the bottom pressure under the nonlinear water waves is studying. Just now in oceanographic practice, the linear theory of water waves is the most popular in determining the relation between bottom pressure and sea surface. However the linear theory is not entirely correct to analyze strongly wave nonlinear processes. Such processes are for example, storm surge, and abnormally large wave or freak waves. Here numerical solutions of the fully nonlinear equations of motion of an ideal fluid in conformal variables is presented. The comparative evaluation of deficiencies in the linear theory calculating fluid pressure induced by surface waves is analysed. The exact formula for the calculation of the pressure in fluid using a conformal representation of the Euler equation is derived. It is shown the linear theory may underestimate the bottom pressure induced by strongly nonlinear surface waves ($ka = 0.08$, where k - wave number, a - wave amplitude), more than 17% in a shallow basin ($kh = 0.58$, where h - depth).