



Restoration of the surface wave elevation through given pressure inside the liquid

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It is very useful from the engineering point of view to get the way to recalculate the pressure values measured inside the liquid to the elevation of the free surface. Up to now this problem, despite its obvious importance, has not received any satisfactory solution. This is mostly due to the fact that the waves on the surface may be of different nature: to be periodic or non-periodic, short or long, linear or non-linear, with dispersion or not.

In our study, we examined both theoretically and experimentally the ability to restore the elevation of the free surface, using the data for the pressure within the fluid in the case of nonlinear periodic waves. We have seen how the wave surface elevation restores using the second and third approximations.

The experiments were fulfilled in the hydro flume having 40 m length, 1.0 m width, and 1.2 m height. The depth of fluid was 0.6 m. The shield-type wavemaker produced the periodic waves having large amplitude. The wave height was varied in the range of 4 to 22 cm. The wave periods were from 1.0 to 2.6 sec. Depth of the liquid was 66 cm. In the experiments, we have measured the pressure wave at about half the depth (more precisely, at a depth of 26.5 cm) and at the bottom. The free surface elevation was measured directly by wavemeter.

The comparison of experimental and numerical data shows clearly that theoretical results describe satisfactory the physics of the problem.