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On the damping of surface waves due to turbulence

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Damping of gravity-capillary waves (GCW) due to turbulence is a classical hydrodynamic problem which has important geophysical applications, such as radar and optical imaging of ship wakes on the sea surface. A new method of investigation of GCW damping due to turbulence and obtained first results are described. Damping of GCW parametrically excited in a vessel installed on a vibrating table was studied. GCW and turbulence were generated in a two-frequency regime (a sum of two harmonic oscillations). The high frequency/small amplitude signal was used for parametric excitation of GCW, the low frequency/large amplitude signal – for generation of turbulence when flowing a stable perforated plate around. The wave damping coefficient was determined when measuring the GCW excitation threshold, and the parameters of turbulence were measured with PIV and PTV methods. Dependencies of GCW damping coefficient vs. wave frequency at different intensities of turbulence are presented and the turbulent viscosity values are estimated from these dependencies.
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