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Generalization of energy balance equation for non-uniform

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The traditional kinetic equation used for describing wind wave evolution in Ocean is obtained under the supposition of wave field spatial homogeneity. In order to eliminate the mentioned drawbacks the systematic procedure of spectrum decomposition by horizontally inhomogeneous waves in series over small parameter of horizontal non-uniformity e is proposed. This procedure helps producing a traditional transport equation for wave spectrum in a linear approximation with small parameter e and it allows estimating the following approximations of the equation. It is shown that the transport equation becomes similar in its structure to the Schroedinger Quantum Mechanical Equation producing the periodic solution. The obtained generalization of the energy transport equation shows that there are spectral density time-space periodic structures well known from field measurements. So, the conclusion about a wave character of wave energy density in non-uniform propagation is drawn. It is also shown that the propagation velocity of these waves is different as it is from that of ordinary surface gravity wave propagation, although such a difference is rather small. Low frequency wave energy is weakly dispersed as waves' velocity depends on their length, however only in the next approximation. The carried out research reveals the limited character of applying traditional wave energy balance equation for stimulating wind waves mathematically. Using a geometric optics approximation this equation has been used for more than forty years to describe special non-uniform field of wind wave spectrum. The generalization of the equation for a spatially non-homogeneous case is proposed in paper in the form of the equation similar to the Schroedinger Quantum Mechanical Equation producing periodic wave solutions.

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