Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00209, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-00209
EGU General Assembly 2008

Effects of three-wave interactions in a gravity-capillary range of wind waves

V. Dulov, M. Kosnik

Marine Hydrophysical Institute, Sevastopol, Ukraine (dulov1952@list.ru)

Formation of a wave number spectrum of short wind waves under influence of three-wave interactions in gravity-capillary and capillary ranges is considered. The spectra are found by numerical integration of the kinetic equation in time up to saturation. Three-wave interactions are described by exact collision integral without introduction of any additional assumptions simplifying a problem. Procedure of calculation reproduces the theoretical spectra of Zakharov and Filonenko (1967) corresponding to “energy equipartition” and “inertial interval” cases.

As a result of numerical calculations it is clearly shown, that the main role of three-wave interactions consists in energy transfer from short gravity waves to waves of smaller lengths. The transfer can be realized via both locally in Fourier-space interactions and direct interactions of short and long waves described in terms of collision integral. Prominent feature of the numerical model is a dip on curvature spectrum in the area of phase speed minimum that becomes filled in if the wind input is added in the kinetic equation. An account of interaction of short and long waves results in increase of a spectrum level in capillary range up to some times. Observable spectra in gravity-capillary and capillary ranges can be explained as a result of the balance for weak nonlinear transfer and viscous dissipation.