



Nonlinear gravity waves in the water flow with inhomogeneous vorticity

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Nonlinear Schrodinger equation is derived for weakly modulated nonlinear wave packets in the infinite-depth water flow with inhomogeneous vorticity. Governing 2-D equations are written in Lagrangian variables. Nonlinear Schrodinger equation is obtained in the third order of perturbation theory taking into account weak non-uniform vortex current. Two limiting cases are analyzed. The first one corresponds to the uniform surface flow and is described by the classic nonlinear Schrodinger equation allowed the modulational instability. The second one is the Gerstner's wave packet. In this limiting case the nonlinear term is absent confirming known fact that nonlinear Gerstner's wave has the linear dispersion relation.