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High-order nonlinear evolution models for topographic Rossby waves

A. Kurkin (1), **O. Poloukhina** (1,2)

(1) Department of Applied Mathematics, State Technical University,Nizhny Novgorod, Russia, (2) Laboratory of Hydrophysics and Nonlinear Acoustics, Institute of Applied Physics, Nizhny Novgorod, Russia (poloukhin@hydro.appl.sci-nnov.ru)

The review of existing nonlinear evolution models for topographic Rossby waves is given. The procedure of derivation of extended Korteweg - de Vries equation is proposed for the case when background conditions (Coriolis parameter and bottom relief) are strongly dependent on preferential direction and wave is propagating orthogonally. The evolution of waves and localized solutions are investigated for several examples of external conditions. For certain family of background conditions it is found that nonlinear and nonlinear dispersive coefficients in evolution equation are zero in all orders of asymptotic expansion, hence the waves are fully linear, and their dynamics is determined by the dispersive terms.