

IMPLICIT DIFFERENCE SCHEMES FOR THE
CHARNEY-Obukhov EQUATION

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Abstract

In the present work, first- and second-order accuracy implicit difference schemes for the numerical solution of the nonlinear Charney-Obukhov equation are constructed. For each scheme the approximation error is estimated and the convergence of the iterative process is investigated. On the basis of numerical calculations accomplished by means of these schemes, the propagation of a two-dimensional nonlinear solitary Rossby vortex structure is studied. A comparative analysis of the obtained numerical results is carried out. In addition, for the considered equation there is proved the theorem of uniqueness of the solution in case of periodic boundary conditions and is obtained the sufficiently general law of integral conservation.

Key words and phrases: Solitary Rossby Wave, Charney-Obukhov Equation, Hasegava-Mima Equation, Implicit Difference scheme.

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