

On the article V.S.Dryuma "On the analytical solution of the two-dimensional Korteweg-de Vries equation", Sov. Phys. JETP Lett. 19, 753-757 (1974)

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The article is devoted to the application of the Inverse Scattering Transform Method (IST) discovered in 1967 year to exact integration of nonlinear p.d.e.,

$$(U_t + UU_x + U_{xxx})_x + \pm U_{yy} = 0, \quad (1)$$

known as the Kadomtsev-Petviashvili equation (KP), which describe propagation waves in various problems of the plasma physics and hydrodynamics. By the author was first shown that possibilities of the IST-method can be essentially extend and it can be used to the integration of multi-dimensional equations having physical interest. The representation of Lax $\hat{L}_t = [\hat{L}, \hat{A}]$, which is the basis of this method and previously was known only for the Korteweg-de Vries equation ($U_t + UU_x + U_{xxx} = 0$) and for the nonlinear Schrodinger equation ($\Psi_t + \Psi_{xx} + |\Psi|^2\Psi = 0$) allowed to construct sets of exact solutions of these equations that has led to the discovery of notion of Soliton, which play an important role in modern mathematics and physics. Multi dimensional generalization of the IST-method present time are used to solving the problems of differential and algebraic geometry, in the various branches of the field theory and gravitation. As example discovery of the gage equivalence between the NS-equation $iv_t + v_{xx} + 2|v|^2v = 0$ and the KP equation $(4v_t + 6vv_x + v_{xxx})_x = 3v_{yy}$ has found application in the theory of the rogue waves, meeting in the hydrodynamics, dynamics of gases and investigation of their properties can to have practical meanings.

References:

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