

Realization of the inverse scattering transform method for the Korteweg-de Vries equation

Sergei Grudsky¹, Vladislav Kravchenko², and Sergii Torba³

¹Cinvestav

²CINVESTAV del IPN

³CINVESTAV IPN

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Abstract

A method for practical realization of the inverse scattering transform method for the Korteweg-de Vries equation is proposed. It is based on analytical representations for Jost solutions and for integral kernels of transformation operators obtained recently by the authors. The representations have the form of functional series in which the first coefficient plays a crucial role both in solving the direct scattering and the inverse scattering problems. The direct scattering problem reduces to computation of a number of the coefficients following a simple recurrent integration procedure with a posterior calculation of scattering data by well known formulas. The inverse scattering problem reduces to a system of linear algebraic equations from which the first component of the solution vector leads to the recovery of the potential. We prove the applicability of the finite section method to the system of linear algebraic equations and discuss numerical aspects of the proposed method. Numerical examples are given, which reveal the accuracy and speed of the method.

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