

The Ostrovsky-Vakhnenko equation by a Riemann–Hilbert approach

Dmitry Shepelsky (ILT Kharkov)

Abstract. We present an inverse scattering transform (IST) approach for the (differentiated) Ostrovsky-Vakhnenko (OV) equation

$$u_{txx} - 3u_x + 3u_x u_{xx} + uu_{xxx} = 0.$$

This equation can also be viewed as the short wave model for the Degasperis-Procesi (DP) equation. A particular feature of both the DP and OV equations is that the spatial equations of the associated Lax pairs are of the third order. Our IST approach is based on an associated Riemann–Hilbert problem, which allows us to give a representation for the classical (smooth) solution, to get the principal term of its long time asymptotics, and also to describe loop soliton solutions.

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