

Rational Solutions of Multi-component Nonlinear Schrödinger Equation and Complex Modified KdV Equation

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Abstract

In this paper, the critical condition to achieve rational solutions of the multi-component nonlinear Schrödinger equation is proposed by introducing two nilpotent Lax matrices. Taking the series multisections of the vector eigenfunction as a set of fundamental eigenfunctions, an explicit formula of the n th-order rational solution is obtained by the degenerate Darboux transformation, which is used to generate some new patterns of rogue waves. A conjecture about the degree of the n th-order rogue waves is summarized. This conjecture also holds for rogue waves of the multi-component complex modified Korteweg-de Vries equation. Finally, the semi-rational solutions of the Manakov system are discussed.

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