Integrable properties of the general coupled nonlinear Schrödinger equations

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Abstract:

In this paper, a general integrable coupled nonlinear Schródinger system is investigated. In this system, the coefficients of the self-phase modulation, cross-phase modulation, and four-wave mixing terms are more general while still maintaining integrability. The N-soliton solutions in this system are obtained by the Riemann-CHilbert method. The collision dynamics between two solitons is also analyzed. It is shown that this collision exhibits some new phenomena (such as soliton reflection) which have not been seen before in integrable systems. In addition, the recursion operator and conservation laws for this system are also derived.