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Yang–Baxter properties of vector NLS solitons

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Abstract

Collisions of solitons for the vector Nonlinear Schrödinger (VNLS) equation are investigated from various viewpoints. By suitably employing Manakov's well-known formulae for the polarization shift of interacting vector solitons, it is shown that the multisoliton interaction process is pairwise and the net result of the interaction is independent of the order in which such collisions occur. Importantly, this is shown to be related to the fact that the map determining the interaction of two solitons with nontrivial internal degrees of freedom (e.g. vector solitons) satisfies the Yang-Baxter relation. The associated matrix factorization problem is discussed in detail.