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Integrable lattice equations and Yang–Baxter maps

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Abstract

In the first part of the talk the relation between integrable lattice equations and Yang–Baxter maps is reviewed. This relation is based on the multidimensional consistency property and the existence of suitable symmetries of the corresponding equations. Examples are given using the Adler–Bobenko–Suris (ABS) classification and other multi-field integrable equations in particular the ones presented by Adler and Yamilov (AY) related to the nonlinear superposition formulae for the Bäcklund transformations of the nonlinear Schrödinger system and specific ferromagnetic models. One notices that the above procedure cannot be applied to integrable lattice equations related to elliptic curves because of lack of suitable symmetries.

In the second part some new results are presented. It is shown how all 2-field equations in the AY list can be cast into Yang–Baxter map form. Moreover all integrable quad-graph equations in the ABS classification list (including the ones related to elliptic curves) can be lifted to integrable 2-field equations that in turn can be cast to Yang–Baxter map form. For the latter there is an alternative way to be cast into dynamical Yang–Baxter map form without lifting.