

Higher Dimensional Integrable Models from Lower Ones via Miura Type Deformation Relation

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To find nontrivial high dimensional integrable models (especially in (3+1)-dimensions) is one of the most important problems in nonlinear physics. A systematic method to find some nontrivial high dimensional integrable models is established by means of *noninvertible* deformation relations. Starting from a noninvertible Miura type transformation, we find that the (1+1)-dimensional sinh-Gordon model appearing in many physical fields is a deformation of the (0+1)-dimensional Riccati equation. A high dimensional Miura type deformation (including two different (3+1)-dimensional reductions) of the heat conduction equation is proved to be Painlevé integrable. Some special types of explicit exact solutions, like multi-plane and/or multi-camber soliton solutions, multi-dromion solutions and multiple ring soliton solutions, are obtained.

Key words: Noninvertible Deformation; High Dimensional Integrable Models; Camber Solitons; Ring Solitons.