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A new multi-component two dimensional Toda lattice hierarchy

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Abstract

We propose a new multi-component two-dimensional Toda lattice hierarchy (mc2dTLH) which includes two-dimensional Toda lattice equation with self-consistent sources (2dTLSCS) as the first non-trivial equation. The Lax representations for this mc2dTLH are presented. We construct a non-auto-Bäcklund Darboux transformation (DT) for 2dTLSCS by applying the method of variation of constant (MVC) to ordinary DT of 2dTLSCS. This non-auto-Bäcklund DT enables us to obtain various solutions such as solitons, rational solutions etc., to 2dTLSCS.