Hamiltonian Systems and Darboux Transformation Associated with a 3×3 Matrix Spectral Problem

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Abstract: Starting from a 3×3 matrix spectral problem, we derive a hierarchy of nonlinear equations. It is shown that the hierarchy possesses bi-Hamiltonian structure. Under the symmetry constraints between the potentials and the eigenfunctions, Lax pair and adjoint Lax pairs including partial part and temporal part are nonlinearied into two finite-dimensional Hamiltonian systems (FDHS) in Liouville sense. Moreover, an explicit N-fold Darboux transformation for CDNS equation is constructed with the help of a gauge transformation of the spectral problem.

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