

## A Hierarchy of Integrable Lattice Soliton Equations and New Integrable Symplectic Map

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**Abstract:** Starting from a discrete spectral problem, a hierarchy of integrable lattice soliton equations is derived. It is shown that the hierarchy is completely integrable in the Liouville sense and possesses discrete bi-Hamiltonian structure. A new integrable symplectic map and finite-dimensional integrable systems are given by nonlinearization method. The binary Bargmann constraint gives rise to a Bäcklund transformation for the resulting integrable lattice equations. At last, conservation laws of the hierarchy are presented.

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**Key words:** lattice soliton equation, discrete Hamiltonian structure, integrable symplectic map

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