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Integrability and soliton interaction of a resonant nonlinear Schrödinger equation via binary Bell polynomials. (English) [Zbl 1270.37046](#)

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Summary: Under investigation in this paper is a resonant nonlinear Schrödinger equation for the response of a hypothetical resonance medium to an action of a quasimonochromatic wave or the propagation of one-dimensional long magnetoacoustic waves in a cold collisionless plasma subject to a transverse magnetic field. Binary Bell polynomials are employed to derive the bilinear form, Bäcklund transformation (BT) and Lax pair in the 3×3 matrix form. Two sets of the binary Bell polynomials are considered. Infinite conservation laws are also constructed from the BT in the binary-Bell-polynomial form. Moreover, two-soliton solutions are obtained through the Hirota method. Finally, the regular, intermediate-state and resonant soliton interactions are analyzed under certain conditions.

MSC:

- [37K10](#) Completely integrable infinite-dimensional Hamiltonian and Lagrangian systems, integration methods, integrability tests, integrable hierarchies (KdV, KP, Toda, etc.)
- [37K35](#) Lie-Bäcklund and other transformations for infinite-dimensional Hamiltonian and Lagrangian systems
- [35C08](#) Soliton solutions
- [35Q55](#) NLS equations (nonlinear Schrödinger equations)
- [11B73](#) Bell and Stirling numbers
- [33C47](#) Other special orthogonal polynomials and functions

Keywords:

[resonant nonlinear Schrödinger equation](#); [integrability](#); [resonant interactions](#); [binary Bell polynomials](#)

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