Qin, Bo; **Tian, Bo**; **Liu, Li-Cai**; **Wang, Ming**; **Lin, Zhi-Qiang**; **Liu, Wen-Jun**

Bell-polynomial approach and N-soliton solution for the extended Lotka-Volterra equation in plasmas. (English) Zbl 1316.76116

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Summary: Symbolically investigated in this paper is the extended Lotka-Volterra (ELV) equation, which can govern the kinetics of the discrete peaks of the weak Langmuir turbulence in plasmas without the linear damping and random noise. Binary Bell polynomials are applied to the bilinearization of the discrete system. Bilinear Bäcklund transformation of the ELV equation is constructed. N-soliton solution in terms of the extended Casorati determinant is also presented and verified. Propagation and interaction behaviors of the Langmuir turbulence are analyzed. It is demonstrated that the number of the interacting Langmuir waves can influence the soliton velocity and amplitude as well as the collision phase shift. Graphic illustrations of the solitonic collisions show that the repulsion effects and nonlinear interactions are also associated with the number of the interacting Langmuir waves.

MSC:

76X05	Ionized gas flow in electromagnetic fields; plasmic flow
39A12	Discrete version of topics in analysis
37K35	Lie-Bäcklund and other transformations for infinite-dimensional Hamiltonian and Lagrangian systems
35C08	Soliton solutions
76F20	Dynamical systems approach to turbulence

Keywords:

Langmuir turbulence; interacting Langmuir waves

Full Text: DOI

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