

# VARIATIVITY OF MODE-MODE COUPLINGS IN A THREE-COMPONENT TODA LATTICE

*O.O. Vakhnenko*

Bogolyubov Institute for Theoretical Physics,  
Nat. Acad. of Sci. of Ukraine  
(14b, Metrolohichna Str., Kyiv 03143, Ukraine;  
e-mail: *vakhnenko@bitp.kiev.ua*)

## S u m m a r y

The alternative extension of the one-component Toda lattice into a three-component integrable nonlinear lattice is proposed. The main idea consists in replacing the elements of the standard Toda spectral operator by  $3 \times 3$  submatrices given by the linear combinations of three basic matrices associated with the third-order Abel group. Specifically, this procedure assumes the splitting of the previously unique spectral parameter into two linearly independent parts. The zero-curvature representation of the extended system is found, and one of its possible parametrizations (namely the parametrization extracting the global Toda field supplemented by two satellite fields) is explicitly presented. The Lagrangian formulation for a nonlinear lattice corresponding to the chosen parametrization is obtained. In addition, the generic variability of admissible parametrizations allow us to generate a broad class of integrable lattice models distinguished by the choice of mode-mode couplings.