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Discrete solitons for the focusing Ablowitz-Ladik equation with non-zero boundary conditions via inverse scattering transform

Soliton solutions of the focusing Ablowitz-Ladik (AL) equation with nonzero boundary conditions at infinity are derived within the framework of the inverse scattering transform (IST). After reviewing the relevant aspects of the direct and inverse problems, explicit soliton solutions will be discussed which are the discrete analog of the Tajiri-Watanabe and Kutznetsov-Ma solutions to the focusing NLS equation on a finite background. Then, by performing suitable limits of the above solutions, discrete analog of the celebrated Akhmediev and Peregrine solutions will also be presented. These solutions, which had been recently derived by direct methods, are obtained for the first time within the framework of the IST, thus providing a spectral characterization of the solutions and a description of the singular limit process.