Asymptotics for the focusing integrable discrete nonlinear Schrödinger equation

Hideshi YAMANE
Department of Mathematical Sciences, Kwansei Gakuin University, Japan
Email: yamane@kwansei.ac.jp

The focusing integrable discrete nonlinear Schrödinger equation can be solved by inverse scattering. Eigenvalues appear in quartets. In the reflectionless case, it admits a (multi-)soliton solution under generic assumptions. Phase shifts are determined by the eigenvalues. We consider what happens if the reflection coefficient does not vanish identically. We can show that the soliton resolution conjecture is valid in this case. Namely, the solution is asymptotically a sum of 1-solitons. In $|n/t| < 2$, the phase shifts depend on the eigenvalues and the reflection coefficient. If $|n/t|$ is not less than 2, they are independent of the reflection coefficient. The proof is based on the method of nonlinear steepest descent due to Deift and Zhou. Details can be found in arXiv:1512.01760 [math-ph].