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A discrete Darboux-Lax scheme for integrable difference equations

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In this talk, we propose a new method for constructing solutions to quad-graph equations that do not necessarily possess the 3D consistency property [1]. The method is based on the systematic construction of Bäcklund transformations. As an illustrative example we use the Adler–Yamilov type system which is related to the nonlinear Schrödinger equation. In particular, we construct an auto-Bäcklund transformation for this discrete system, its superposition principle, and we employ them in the construction of the one- and two-soliton solutions of the Adler–Yamilov system.

References

- [1] X. Fisenko, S. Konstantinou-Rizos and P. Xenitidis, *Chaos, Solitons and Fractals* **158**, 112059 (2022).