SIDE 14.2

Contribution ID : 21

Degree growth calculations for lattice equations

Thursday 22 Jun 2023 at 11:30 (00h30')

Content :

Integrability criteria that have been enormously successful for second order mappings, such as singularity confinement or zero algebraic entropy, are often applied to lattice equations as though the latter were mere mappings.
In this talk we will show that such a naïve approach can (and does) lead to all sorts of contradictions and that considerable care is needed when using such methods to investigate the integrability of a given lattice equation.

More precisely:
In this talk we show that the results of degree growth calculations for lattice equations strongly depend on the initial value problem that one chooses, either because of problems that arise in the past light-cone, or because of interferences in the future light-cone.
Among the examples we treat are initial value problems for dKdV, discrete Liouville and dToda, for which the degree growth becomes exponential, in contrast to the common belief that discrete integrable equations must have polynomial growth and that linearizable equations necessarily have linear degree growth, regardless of the initial value problem one imposes.
Finally, as a possible remedy for one of the observed anomalies, we also propose basing integrability tests that use growth criteria on the degree growth of a single initial value instead of all the initial values.

Reference:
J. Hietarinta, T. Mase & R. Willox: J. Phys. A: Math. Theor. 52 49LT01 (2019).

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