

Tropical limit of matrix solitons

Tuesday, September 3, 2019 5:00 PM (30 minutes)

The “tropical limit” of a matrix (KdV, Boussinesq, or the like) soliton solution in two-dimensional space-time consists of a piecewise linear graph in space-time, together with values of the dependent variable along its segments. In two space-time dimensions, it associates with such waves a point particle picture, in which free “particles” with internal degrees of freedom interact at definite points in space-time. Whereas for KdV the values of the dependent variable attached to incoming and outgoing solitons at a vertex are related by a (highly nonlinear) Yang-Baxter map, such a map appears to be insufficient in the Boussinesq case to describe all possible soliton interactions in the tropical limit. The interaction in case of solitons in more than two dimensions is definitely richer. We will report about some insights for soliton solutions of the KP equation.

This talk is based on joint work with A. Dimakis [1,2,3] and X.-M. Chen [3].

[1] A. Dimakis and F. Müller-Hoissen: Matrix KP: tropical limit and Yang-Baxter maps, *Lett. Math. Phys.* 109 (2019) 799-827.

[2] A. Dimakis and F. Müller-Hoissen: Matrix KP: tropical limit, Yang-Baxter and pentagon maps, *Theor. Math. Phys.* 196 (2018) 1164-1173.

[3] A. Dimakis, F. Müller-Hoissen and X.-M. Chen: Matrix Boussinesq solitons and their tropical limit, *Physica Scripta* 94 (2019) 035206.

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