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S. Abenda (online)

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Tropical curves and KP solitons: the case of banana graphs

The Kadomtsev–Petviashvili (KP) II equation is the first member of an integrable hierarchy in 2+1-variables, it contains as reductions other interesting integrable systems (Korteweg de Vries, Boussinesq, …), and it possesses two distinguished classes of solutions:

1 KP-finite-gap solutions are parametrized by non special divisors on algebraic curves and are expressed in terms of Riemann theta functions;

2 KP solitons are parametrized by points in finite-dimensional Grassmannians and may be obtained from rational degenerations of finite-gap solutions.

The relation between these two classes has been the subject of intensive study in recent years and shows interesting connections with tropical geometry. Since, in the tropical limit, the Riemann theta function becomes a finite sum of exponentials, one expects that the combinatorial structure of the soliton solutions is encoded by tropical curves and their Jacobians.

In this talk based on a paper in progress with T.O. Çelik, C. Fevola and Y. Mandelshtam, I will explain this correspondence for tropical degenerations of genus g hyperelliptic curves associated with banana graphs (metric graphs with two vertices connected by g+1 edges).