Bivariate orthogonal polynomials, 2D Toda lattices and Lax–type pairs

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We explore the connection between an infinite system of particles in $\mathbb{R}^2$ described by a bi–dimensional version of the Toda equations with the theory of orthogonal polynomials in two variables. We define a 2D Toda lattice in the sense that we consider only one time variable and two space variables describing a mesh of interacting particles over the plane. We show that this 2D Toda lattice is related with the matrix coefficients of the three term relations of bivariate orthogonal polynomials associated with an exponential modification of a positive measure. Moreover, block Lax pairs for 2D Toda lattices are deduced.

This is a joint work with Cleonice Bracciali, Departamento de Matemática Aplicada, IBILCE, UNESP-Universidade Estadual Paulista, Brazil.