

MATHEMATICS COLLOQUIUM

Applications of integrable lattice hierarchies to random matrices

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Abstract: The orthogonal, unitary, and symplectic ensembles of random matrices are standard models for statistical and quantum physics. A fundamental object of study is the partition function, which is expressed as an integral over the ensemble of random matrices. In the unitary case this function is a tau-function of the Toda lattice hierarchy, meaning it generates solutions of the hierarchy. The Toda lattice is a classical example of an integrable hierarchy and possesses a number of interesting structures. This partition function is also an interesting combinatoric object giving the number of maps on oriented Riemann surfaces partitioned by the genus of the surface. We will explain this connection and show that the differential equations governing this partition function can be used to give explicit formulas for the map enumeration problems. We will then show some highlights of the existing theory for the orthogonal and symplectic ensembles of random matrices where the analogue of the Toda lattice is the Pfaff lattice and the combinatoric problems are now over unoriented Riemann surfaces.

Date: Wednesday, **February 6, 2008**
Time: 4:00 pm – 5:00 pm
Place: J. Wiener Lecture Hall, MAGC 1.302

Refreshments will be served at 3:50pm.

For further information or for special accommodations, contact Dr. Karen Yagdjian at 381-2145, via email at yagdjian@utpa.edu, or visit www.math.panam.edu/colloquia.html