1003-05-1103   **Nicholas M. Ercolani*** (`ercolani@math.arizona.edu`), Department of Mathematics, University of Arizona, Tucson, AZ 85721, and **Kenneth T.-R. McLaughlin** and **Virgil Pierce**. *Random Matrices, Graphical Enumeration and the Continuum Limit of Toda Lattices I.*

We have been considering the large N expansion of a random matrix partition function which describes the expectations of matrix observables with respect to a conjugation-invariant measure on the given ensemble of matrices. Here the ensemble is the space of N x N Hermitean matrices.

The partition function has a natural interpretation in terms of a tau function for the Toda Lattice hierarchy. A particular scaling limit of this Toda hierarchy leads to a PDE hierarchy which characterizes the coefficient terms in the large N expansion of the partition function. One can recursively solve for these terms which in turn provide detailed information about graphical enumeration on Riemann surfaces of arbitrary finite genus.

This is joint work with Ken Mclaughlin and Virgil Pierce who will also be speaking in the session on aspects of this topic. This talk will develop the background for and overview of our results. The subsequent talks will focus on the derivation and properties of the continuum limit and the geometric fine structure of the large N expansion. (Received October 04, 2004)