1044-35-118   **Yuji Kodama** (`kodama@math.ohio-state.edu`), Department of Mathematics, 231 W 18th Ave, Columbus, OH 43210-1174, and **Virgil U Pierce*** (`piercevu@utpa.edu`), Department of Mathematics, 1201 W University Drive, Edinburg, TX 78539-2999. *Universality of the Toda lattice for integrable hierarchies.*

The Unitary Ensembles (UE) of random matrices are closely associated with the Toda lattice hierarchy of ODEs, a classic example of an integrable system of equations. Explicitly the partition function of the unitary ensemble is a tau-function of the Toda lattice hierarchy, meaning that solutions of the hierarchy are generated by logarithmic derivatives of this function. The Orthogonal and Symplectic Ensembles (OE and SE) of random matrices are closely associated to the Pfaff lattice hierarchy. Their partition functions are tau-functions for the Pfaff lattice. The asymptotic expansions of the logarithm of the partition functions leads to continuum limits for the Toda and Pfaff hierarchies. There is a universality between all three ensembles of random matrices one consequence of which is that the leading orders of the logarithm of the partition functions for large matrices agree. We will show that this universality, in the case of Gaussian ensembles, is observed as a universality of the continuum limits of the Toda and Pfaff lattice hierarchies. (Received August 26, 2008)