Meeting: 1003, Atlanta, Georgia, AMS CP 1, AMS Contributed Paper Session

1003-06-1662 **Michelle R DeDeo*** (mdedeo@unf.edu), Department of Mathematics and Statistics, 4567 St. John's Bluff Rd., S., Jacksonville, FM 32259, and **Elinor Velasquez**. *Symplectic Maps and Generlaizations of the Toda Lattice.*

Imagine N particles and $N-1$ springs such that only nearest neighbor interactions occur. Let each spring force be governed by an exponential, and consequently non-linear, potential and suppose that the particles an springs are equidistantly placed on the real line. The system we describe is called the Toda lattice where we refer to "lattice" in the sense of solid state physics. Toda originally designs this lattice and a type of canonical transformations, or symplectic mapping, known as the dual transformation, to describe phenomena in solid state lattice theory. We write the equations of motion for the lattice in the Lax form which is well-known from scattering theory as the Lax form easily shows that the Toda lattice is a completely integrable system which means that we can deduce the constants of motion. Of all the possible solutions, we often choose to focus on soliton behavior in the lattice. Here we study the dual transformation applied to N particles and $N-1$ springs that are no longer constrained to the real line. For simplicity, we assume the Hamiltonian system formed to be embedded in Euclidean n-space with the standard metric and extend the classical case to higher dimensions. (Received October 06, 2004)