1048-39-71 **Willy A Hereman*** (`whereman@mines.edu`), Dept. of Mathematical and Computer Sciences, Colorado School of Mines, Goden, CO 80401-1887. *Symbolic Computation of Lax Pairs of Two-Dimensional Nonlinear Partial Difference Equations.*

A partial difference equation (P-Delta-E) is a fully discretized version of a partial differential equation. The talk focuses on 2-dimensional nonlinear P-Delta-Es which are completely integrable, i.e., they admit a Lax representation.

Based on work by Nijhoff, Bobenko and Suris, a method to compute Lax pairs will be presented. The method is largely algorithmic and can be implemented in the syntax of computer algebra systems, such as Mathematica and Maple.

A Mathematica program will be presented that automatically computes Lax pairs for a variety of 2-dimensional P-Delta-Es, including lattice versions of the potential Korteweg-de Vries (KdV) equations, the modified KdV and sine-Gordon equations, as well as lattices derived by Adler, Bobenko, and Suris. (Received January 23, 2009)