1058-35-79 **Willy A Hereman*** (whereman@mines.edu), Dept. Mathematical and Computer Sciences, Colorado School of Mines, Golden, CO 80401-1887, and **Loren Douglas Poole**. *Symbolic Computation of Conservation Laws of Nonlinear Partial Differential Equations in Multiple Space Dimensions.*

A method will be presented for the symbolic computation of conservation laws of nonlinear partial differential equations (PDEs) involving multiple space variables and time.

Using the scaling symmetries of the PDE, the conserved densities are constructed as linear combinations of scaling homogeneous terms with undetermined coefficients. The variational derivative is used to compute the undetermined coefficients. The homotopy operator is used to invert the divergence operator, leading to the analytic expression of the flux vector.

The method is algorithmic and has been implemented in the syntax of the computer algebra system MATHEMATICA. The software is being used to compute conservation laws of nonlinear PDEs occuring in the applied sciences and engineering.

The software package will be demonstrated for PDEs that model shallow water waves, ion-acoustic waves in plasmas, sound waves in nonlinear media, and transonic gas flow. The featured equations include the Korteweg-de Vries and Boussinesq equations, the Navier and Kadomtsev-Petviashvili equations, and the Zakharov-Kuznetsov and Khoklov-Zabolotskaya equations. (Received February 03, 2010)