1056-35-1414 **L. Douglas Poole*** (lpoole@mines.edu), Dept of Mathematical and Computer Sciences, Colorado School of Mines, Golden, CO 80401, and **Willy Hereman** (whereman@mines.edu), Dept of Mathematical and Computer Sciences, Colorado School of Mines, Golden, CO 80401. *Symbolic Computation of Conservation Laws of Nonlinear Partial Differential Equations.*

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 by computing conservation laws for the Korteweg-de Vries equation which models shallow water waves, the Zakharov-Kuznetsov equation which models ion-acoustic waves in plasmas, and the Khoklov-Zabolotskaya equation which models sound waves in nonlinear media. (Received September 21, 2009)