1104-65-154 **Gideon Simpson*** (simpson@math.drexel.edu), Department of Mathematics, Korman Center - Room 206, 33rd and Market Streets, Philadelphia, PA 19104. *Algorithms for Nonlinear Bound States in Hamiltonian PDE.*

Nonlinear bound states, including solitons, are found in many dispersive Hamiltonian PDE, including the Nonlinear Schrödinger equation and the Nonlinear Wave equation. Numerically computing these solutions requires care, as they solve a nonlinear elliptic equation which also has the zero function as a solution; nothing prevents Newton's method from converging to the trivial solution. A number of algorithms have been developed to tackle this problem, including Petviashvilli's method, Spectral Renormalization, and the Imaginary time method. In this talk, I will present results analyzing the application of Petviashvilli's method to the Dirichlet problem, on a domain in $\mathbb{R}^n$ with sufficiently smooth boundary. This work also lends itself to the computation of excited state solutions of the associated problem on $\mathbb{R}^n$. (Received August 29, 2014)