1016-49-78 **D. J. Kaup*** (kaup@ucf.edu), Mathematics Department, PO Box 161364, University of Central Florida, Orlando, FL 32816-1364, and **Thomas K Vogel** (professortom@earthlink.net), Mathematics Department, PO Box 161364, University of Central Florida, Orlando, FL 32816-1364.

The Quantitative Estimation of the Validity of Variational Approximations. Preliminary report.

The Variational Principle of mechanics, and the resulting Euler-Lagrange equations, are powerful means for studying and understanding mathematical and physical evolution systems. This principle has long been used, albeit irregularly, as a means for obtaining approximate solutions in such areas as classical mechanics, quantum mechanics, applied mathematics and for our interests, nonlinear waves. In the latter case, it has frequently been used for obtaining approximate solutions of solitary waves, particularly in those systems where one cannot find exact closed-form solutions. However the variational approximation has its Achilles' heel, for which it has often been criticized. The Achilles' heel is simply that one cannot readily judge how valid the approximation is. And this occurs in spite of the fact that a common observation is when the variational approximation is used, more often than not, its predictions are more valid than one would normally estimate. In this presentation, we shall provide a simple means for obtaining a quantitatively estimation of the validity of a variational approximation. The techniques involved are rather simple and only involve linear methods. (Received February 01, 2006)