1086-65-2965 **Jeffrey W Banks**, **Jeffrey M Connors*** (connors4@llnl.gov), **Jeffrey A Hittinger** and **Carol S Woodward**. *The Error Transport and Adjoint Methods of Numerical Error Estimation.*

We will discuss two methods to estimate discretization errors. Error transport methods seek to estimate entire fields of error by deriving evolution equations for the error and then numerically approximating the solution. Adjoint methods seek to estimate the error in a functional measurement of the (primal) solution. This is accomplished by deriving an equation for the error in the measurement that involves projections of local residuals for the primal solution onto the solution of an adjoint problem.

An important consideration for *a posteriori* error estimation methods is their performance on PDEs for problems that involve weak solution features or other degeneracies. Typically, the errors in such regions are large. For nonlinear problems, the nonlinear behavior in the error field must be resolved in these regions when using the error transport method. On the other hand, when using the adjoint method with a measurement that is sensitive to weak primal solution features, there will be regions where the adjoint solution must be well-resolved. To test the error estimation techniques, we have formulated and will discuss several problems based on linear and nonlinear hyperbolic PDEs, nonlinear, parabolic PDEs with degeneracies and advection-diffusion. (Received September 26, 2012)