1035-I1-1001 **Paul R Bouthellier*** (pbouthe@pitt.edu), 504 East Main Street, Titusville, PA 16354.

Analyzing the Solutions, Approximations, and Stability of Time-Varying Difference and Differential Equations with Excel and Flash.

In most classes in differential equations and numerical analysis, the solution, stability and approximations of difference and differential equations are only considered for equations with constant coefficients. In this talk, the concepts of poles of time-varying systems, the eigenvalues of time-varying systems, and the time-varying version of the Cayley-Hamilton equation will be combined with standard results, such as Taylor series, the Rutta-Kutta method, and multistep methods to see how perturbations in the coefficients of difference and differential equations (and systems of such equations) affect the solutions, approximations, and stability of such equations. If time permits, a system of partial differential equations with time-varying coefficients will also be considered.

The algorithms will be coded in Excel and Flash and will allow students to alter the magnitudes of the perturbations and study how they affect the time-varying poles, solutions, approximations, and stability of the equations and systems of equations.

It often surprises students how fast small perturbations can build up. These projects allow students to see how small errors affect the equations and systems over time and hence emphasize the need for accuracy in modeling, measuring, and programming. (Received September 18, 2007)