1035-M1-408 **Paul R Bouthellier*** (pbouthe@pitt.edu), 504 East Main Street, Titusville, PA 16354. *The Effects of Perturbations on Matrix Multiplication-Interactive Flash Simulation.*

In linear algebra classes the behavior of systems of the form x(k+1)=Ax(k)+u(k) where A is a nxn constant matrix and u(k) is a nx1 input vector are studied.

However, in many practical applications, such as algorithms used in engineering and computer graphics, we need to study the behavior of systems of the form x(k+1)=[A+P(k)]x(k)+u(k), where P(k) is a nxn time-varying perturbation matrix. P(k) can represent round-off errors, incomplete information, errors caused by modeling simplifications, or applications involving time-varying parameters.

The first Flash program examined will allow the student to control the sign and magnitude of the elements of P(k) and study the degree to which the perturbations affect the output of the system. It often surprises students how fast small perturbations can build up.

A second Flash program will use mathematical modeling to create and animate 3D objects. Small errors in defining the objects' translation and rotation matrices will illustrate visually how such errors will distort the objects over time and significantly alter their trajectories.

These projects allow students to see how small errors affect matrix systems over time and hence emphasize the need for accuracy in modeling, measuring, and programming. (Received September 06, 2007)