Meeting: 1005, Newark, Delaware, SS 13A, Special Session on Integral and Operator Equations

1005-93-179 **John A. Burns*** (burns@icam.vt.edu), ICAM - West Campus Drive, Virginia Tech, Blacksburg, VA 24061-0531. *Approximating Dynamical Systems for Design, Control and Optimization of Infinite Diumensional Systems.*

In this presentation we consider the impact of various numerical schemes for approximating infinite dimensional dynamical systems. It has long been known that numerical approximations of partial differential equations that are both stable and consistent yield convergent solutions on compact time intervals. This is one form of the Trotter-Kato Theorem. On the other hand, unless one places additional requirements on the approximation scheme the resulting approximate dynamical system may not be suitable for optimization based design and control. One problem is that the asymptotic behavior of a dynamical system may not be captured even by convergent approximation methods. Another problem is that the dual (adjoint) system may not be approximated and hence optimization algorithms based on the reduced model may not converge to the correct answer. We shall use simple model problems to illustrate these issues and to show how such problems can lead to difficulties in developing computational algorithms for parameter estimation and control. (Received February 08, 2005)