Meeting: 1004, Bowling Green, Kentucky, SS 7A, Special Session on Semigroups of Operators and Applications

1004-47-270 **Frank Neubrander*** (neubrand@math.lsu.edu), Department of Mathematics, Louisiana State University, Baton Rouge, LA 70803. *Hille-Phillips Functional Calculus and Time-Discretization.* Preliminary report.

In the 1979 paper on "High-Accuracy Stable Difference Schemes for Well-Posed Initial-Value Problems," Reuben Hersh and Tosio Kato observed that the Hille-Phillips functional calculus is a powerful tool to investigate convergence and qualitative properties of time-discretization methods for strongly continuous semigroups. We employ recent extensions of their work due to Mihály Kovács to (a) discuss stabilization techniques for approximation methods in the non-analytic case, and (b) the approximation of semigroups $e^{-t(-A)^\gamma}, 0 < \gamma < 1$, where A is the generator of a strongly continuous semigroup $T(t)$ (joint work with Sarah McAllister). A typical result is as follows. Suppose that A generates a bounded, strongly continuous semigroup $T(t)$. Fix $\epsilon > 0$ and $t > 0$. Then there exist $a = a(t,\epsilon) > 0$ and for all $N \geq 0$ (explicitly given) coefficients $k_j = k_j(t,\epsilon,N)$ such that $\|e^{-t(-A)^{\frac{1}{2}}}x - \sum_{j=1}^{N} k_j T(\frac{aj}{N})x\| \leq M_t \frac{1}{N^2}\|(I-A)^3 x\| + \epsilon\|x\|$ for every $x \in D(A^3)$. (Received January 26, 2005)