Public Abstract

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Title:Stability estimates for strongly continuous semigroups and partly parabolic reaction diffusion equations

The dissertation is dedicated to the application of the methods of abstract theory of strongly continuous operator semigroups (and of evolution semigroups in particular) to study of the spectral properties of a class of differential operators on the line that appears when one linearizes partial differential equations about such special solutions as steady states or traveling waves.

First we discuss the stability of the traveling wave solutions of a reaction-diffusion system with a degenerate diffusion matrix. We demonstrate that under some reasonable assumptions on the system, its spectral stability directly implies the linear stability. In particular, we study asymptotic spectral properties of certain first order matrix differential operators, thus generalizing some results known for the evolution semigroups.

We then turn to abstract strongly continuous operator semigroup on Banach spaces, revisit a quantitative version of Datko's Stability Theorem and obtain the norm estimates on the semigroup growth boundaries in terms of the norm of the convolution, L_p -Fourier multipliers, and other operators involved in Datko's Stability Theorem. This generalizes recent results for the Hilbert spaces on estimating M in terms of the norm of the resolvent of the generator of the semigroup in the right half-plane.