

# Stability of uniformly eventually positive $C_0$ -semigroups on $L_p$ -spaces

Hendrik Vogt

For a linear evolution equation  $u'(t) = Au(t)$  in finite dimensions it is well-known that the spectral bound  $s(A)$  being less than 0 implies exponential stability, i.e., the solution  $e^{tA}u(0)$  decays exponentially as  $t \rightarrow \infty$ . We show that the same is true in infinite dimensions if the underlying space is an  $L_p$ -space and  $A$  generates a uniformly eventually positive  $C_0$ -semigroup.

For positive  $C_0$ -semigroups this result is due to Lutz Weis (1995, 1998). We give a short and quite elementary proof that relies on the isomorphy of the spaces  $L_p(a, b; L_p(\Omega))$  and  $L_p(\Omega; L_p(a, b))$ .

## POSITIVE ANALYTIC SEMIGROUPS ON GRAPHS: THE POWER OF FORMS

ESZTER SIKOLYA, EÖTVÖS LORÁND UNIVERSITY (BUDAPEST)

In this talk, we will explore a diffusion problem defined on a network. The network is a graph-like structure consisting of edges and vertices which serve as the scene of the heat conduction process and its boundary conditions. We rewrite the problem in the form of an abstract Cauchy problem on the  $L^2$ -space of the edges and show that the corresponding operator is associated with a sesquilinear form. It turns out that this form satisfies nice properties we studied during the lectures of the Internet Seminar, which guarantee that the operator generates a positive analytic semigroup. We will even be able to extend the semigroup operators to  $L^p$ -spaces such that the extension inherits these nice properties.

The talk is about a joint work with Marjeta Kramar-Fijavž and Delio Mugnolo.

**FROM RIESZ SPACES TO PRE-RIESZ SPACES  
– AND BACK!**

ANKE KALAUCH, TECHNICAL UNIVERSITY OF DRESDEN

In the ISEM lectures,  $C_0$ -semigroups are considered on Banach lattices. Parts of the theory on positive  $C_0$ -semigroups are also developed in ordered Banach spaces, which are instances of so-called pre-Riesz spaces. In the lecture, we give an introduction into the theory of pre-Riesz spaces, show how lattice-like notions and structure preserving operators can be introduced, and study some of their properties. Hereby, the technique of Riesz covers will play a role.

# POSITIVE SEMIGROUPS AND SEMILINEAR EQUATIONS

DANIEL DANERS, UNIVERSITY OF SYDNEY

We use the theory of positive semigroups and spectral theory to show the existence and uniqueness of a solution to an abstract logistic equation on and  $L_p$ -space. This simplifies standard proofs from the literature on semi-linear PDEs and at the same time allows to reduce or even eliminate the requirements on the regularity of domains. This is based on work with Wolfgang Arendt.