L_p-theory for second order elliptic operators with complex coefficients

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The aim of the talk is to show how one can associate the (minus) generator of a C_0-semigroup on $L_p(\Omega)$ with the formal differential expression

$$\mathcal{L} = -\nabla \cdot (a\nabla) + b_1 \cdot \nabla + \nabla \cdot b_2 + q$$

on an open set $\Omega \subseteq \mathbb{R}^n$, with *complex* measurable coefficients $a \colon \Omega \to \mathbb{C}^{N\times N}$, $b_1, b_2 \colon \Omega \to \mathbb{C}^N$ and $q \colon \Omega \to \mathbb{C}$.

Under suitable conditions on the coefficients, one can use Kato's representation theorem for sectorial forms to associate an m-sectorial operator A_2 in $L_2(\Omega)$ with the expression $\mathcal{L}$. The question then is to what L_p-spaces the C_0-semigroup e^{-tA_2} extrapolates. We also discuss the case that the sesquilinear form associated with $\mathcal{L}$ is not sectorial, in which one does not necessarily obtain a C_0-semigroup on $L_2(\Omega)$.

The talk is based on joint work with A. F. M. ter Elst, Z. Sobol and V. Liskevich.