

Self-Adjoint Extensions of Elliptic Partial Differential Operators on Smooth Bounded Domains

J. Behrndt

joint work with M. Langer

It is well-known that all self-adjoint realizations of a regular or singular Sturm-Liouville differential expression can be described with the help of boundary conditions on the functions and their derivatives from the domain of the maximal operator. Moreover the spectral properties of these self-adjoint realizations can be characterized with the help of the Titchmarsh-Weyl function.

The situation is less clear for elliptic partial differential operators. In this talk we consider elliptic second order differential operators on a smooth bounded domain Ω and we discuss which self-adjoint extensions can be described with the help of boundary conditions on $\partial\Omega$. The main difficulty here is, that in contrast to ordinary differential operators the functions in the domain of the maximal operator in general do not assume boundary values on $\partial\Omega$.

We propose a suitable generalization of the boundary triple concept and apply it to elliptic differential operators defined on certain subsets of the domain of the maximal operator. With the help of the associated Weyl function the spectral properties of a class of self-adjoint extensions defined by boundary conditions on $\partial\Omega$ can be characterized.