A Class of Nonlinear Eigenvalue Problems

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This talk is based on joint work with C. Trunk.

Let A be a symmetric operator with defect one in the Krein space $(\mathcal{H}, [\cdot,\cdot])$ such that the form $[A\cdot,\cdot]$ has a finite number of negative squares and let $\{\mathbb{C}, \Gamma_0, \Gamma_1\}$ be a boundary value space for A^+. In this talk we consider a class of λ-dependent boundary value problems of the form

$$(A^+ - \lambda)f = g, \quad \tau(\lambda)\Gamma_0 f = \Gamma_1 f, \quad f \in \mathcal{D}(A^+), \quad g \in \mathcal{H}, \tag{1}$$

where τ has the property that the function $\lambda \mapsto \lambda(\lambda^2+1)^{-1}\tau(\lambda)$ can be written as a sum of a generalized Nevanlinna function and a rational function. We construct a selfadjoint operator $\widetilde{A}$ in a Krein space $\mathcal{H} \times \mathcal{K}$ such that $f = P_{\mathcal{H}}(\widetilde{A} - \lambda)^{-1}|_{\mathcal{H}}\, g$ is a solution of (1). Here it turns out that $\widetilde{A}$ is an operator with a finite number of negative squares.