BOUNDARY CONDITIONS FOR DEGENERATE FOURTH ORDER OPERATORS IN HILBERT SPACES

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Let Ω be a bounded subset of $\mathbf{R}^N$ with smooth boundary $\partial\Omega$ in C^2, $a \in C^2(\overline{\Omega})$ with $a > 0$ in Ω, and A be the fourth order operator defined by $Au := \Delta(a\Delta u)$ (resp. $Au := B^2u$, where $Bu := \nabla \cdot (a\nabla u)$), with general Wentzell boundary condition of the type

$$Au + \beta\frac{\partial(a\Delta u)}{\partial n} + \gamma u = 0 \quad \text{on} \quad \Gamma,$$
$$(\text{resp.} \quad Au + \beta\frac{\partial(Bu)}{\partial n} + \gamma u = 0 \quad \text{on} \quad \Gamma),$$

where $\Gamma := \{x \in \partial\Omega \ : \ a(x) > 0\} \neq \emptyset$. The operator A is be degenerate at the boundary if the coefficient a vanishes on a non-empty proper subset of the boundary. We prove that, under suitable additional boundary conditions, if $\beta, \gamma \in C^1(\partial\Omega)$, $\beta > 0$, then the realization of the operator A on a suitable Hilbert space of L^2 type, with a suitable weight on Γ, is essentially self-adjoint and its closure generates an analytic semigroup. A number of related results are also given. All these results were obtained in a joint work with A. Favini, G.R. Goldstein and J.A. Goldstein [1].

References

1. A. Favini, G.R. Goldstein, J.A. Goldstein, and S. Romanelli, *Fourth order operators with general Wentzell boundary conditions*, (preprint).