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Operators with Wentzell boundary conditions and the Dirichlet-to-Neumann operator

We relate the generator property of an operator A with (abstract) generalized Wentzell boundary conditions on a Banach space X and its associated (abstract) Dirichlet-to-Neumann operator N acting on a "boundary" space ∂X. Our approach is based on similarity transformations and perturbation arguments and allows to split A into an operator A_{00} with Dirichlet-type boundary conditions on a space X_0 of states having "zero trace" and the operator N. If A_{00} generates an analytic semigroup, we obtain under a weak Hille–Yosida type condition that A generates an analytic semigroup on X if and only if N does so on ∂X. Here we assume that the (abstract) "trace" operator $L : X \to \partial X$ is bounded what is typically satisfied if X is a space of continuous functions. Concrete applications are made to various second order differential operators.