Arendt, W.; **ter Elst, A. F. M.**

Gaussian estimates for second order elliptic operators with boundary conditions. (English)

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J. Oper. Theory 38, No. 1, 87-130 (1997).

The authors derive Gaussian estimates for the kernel of the semigroup generated by the operator

$$\mathcal{A}u = -\sum_{i,j=1}^{d} D_j(a_{ij}D_iu) + \sum_{i=1}^{d} b_iD_iu - \sum_{i=1}^{d} D_i(c_iu) + c_0u,$$

with real (not necessary symmetric) coefficients $a_{ij} \in L^\infty(\Omega)$ satisfying a uniform ellipticity condition; b_i, $c_i \in W^{1,\infty}(\Omega)$ and $c_0 \in L^\infty(\Omega)$, $\Omega \in \mathbb{R}^d$.

It is studied the realization A of $\mathcal{A}$ in $L^2(\Omega)$ obtained by quadratic form methods. It is shown that, in the cases of Dirichlet, Neumann, and Robin boundary conditions, A generates a semigroup $S = (e^{-tA})_{t>0}$ given by a kernel $(K_t)_{t>0}$ which satisfies a Gaussian estimate $|K_t(x;y)| \le ct^{-d/2}e^{-b|x-y|^2t^{-1}}e^{\omega t}$, $(x;y)$ almost everywhere for all $t > 0$. Moreover, the authors show that $A + \omega I$ has a bounded H^∞-calculus and it has bounded imaginary powers if ω is large enough.

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MSC:

35J25	Boundary value problems for second-order elliptic equations
47A60	Functional calculus for linear operators
47D06	One-parameter semigroups and linear evolution equations

Keywords:

bounded imaginary powers; kernel of the semigroup