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Erratum

The Norm Convergence of the Trotter–Kato Product Formula with Error Bound

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It was kindly pointed out by Vidmantas Bentkus that there is a small gap, in the proof of Lemma 2.1, *for the case where C is strictly positive, i.e. $C \geq \eta$ for some constant $\eta > 0$.*

We have to establish an estimate

$$\|e^{-tS_\varepsilon} - e^{-tC}\| \leq Mt^{-1}\varepsilon^\alpha$$

for every $\varepsilon > 0$ with a constant M independent of t and ε. To do so, we need to prove that for $S_\varepsilon = \varepsilon^{-1}(1 - F(\varepsilon))$, the inverse S_ε^{-1} exists and is uniformly bounded for every $\varepsilon > 0$.

The proof given in the paper is correct for sufficiently small $\varepsilon > 0$, up to a certain $\varepsilon_0 > 0$, because we can show S_ε^{-1} is uniformly bounded with $\|S_\varepsilon^{-1}\| < 2/\eta$ for all positive $\varepsilon \leq \varepsilon_0$. However, we need to supplement that with a proof for the large ε case. To this end, in the statement of Lemma 2.1, we should have further assumed on $F(t)$, *in the case C is strictly positive*, that for this ε_0 there exists $\delta_0 = \delta_0(\varepsilon_0) > 0$ such that $F(t) \leq 1 - \delta_0(\varepsilon_0)$ for every $t \geq \varepsilon_0$, or that for every $\varepsilon > 0$ there exists $\delta = \delta(\varepsilon) > 0$ such that $F(t) \leq 1 - \delta(\varepsilon)$ for every $t \geq \varepsilon$. Hence we can easily see that for these large ε, S_ε is uniformly bounded with $\|S_\varepsilon^{-1}\| < \varepsilon_0/\delta_0$.

Such an additional assumption on $F(t)$ in Lemma 2.1, for the case C is strictly positive, does not affect the rest of the proof of the main Theorem.

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