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Title: Magnus-type integrators for linear and nonlinear parabolic partial differential equations

Abstract: This work is devoted to the study of explicit Magnus integrators for linear and nonlinear parabolic differential equations. Employing an abstract framework, the considered problems take the form of initial value problems

$$u'(t) = A(t, u)u(t) + f(t), \quad 0 < t \leq T, \quad u(0) \text{ given,}$$

in Banach spaces, X . We perform the study when the domain of the operators $\mathcal{D}(A(t, u)) \subset X$ can depend on $t \in (0, T]$ and $u \in X$. Our analysis includes parabolic partial differential equations under every type of boundary conditions. Under reasonable smoothness assumptions, we study convergence result without any unnatural restrictions on the time stepsize. However, if the error is measured in the domains of the differential operators, then an order reduction in general occurs.