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## High-Order Operator Splitting with Reduced Exponential Evaluations for Bounded Operators

### Communication Info

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- (1) Operator splitting method.
- (2) Baker–Campbell–Hausdorff expansion.
- (3) Bounded operators.

### Abstract

Classical high-order operator splitting methods are commonly constructed through composition techniques, which typically lead to a rapid increase in the number of exponential evaluations. This growth substantially affects computational efficiency, even in the setting of bounded operators. In this work, we introduce a novel strategy for designing higher-order splitting schemes that reduces the number of operator exponentials while maintaining the desired level of accuracy. The approach is based on a refined local error analysis using the Baker–Campbell–Hausdorff expansion, enabling a systematic cancellation of dominant commutator terms. The resulting schemes offer an improved balance between accuracy and computational cost. Numerical experiments demonstrate the effectiveness and efficiency of the proposed approach.

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