Title: Higher Order Methods for PDEs using Successive Convolution

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Abstract:
PDE's are often solved using the method of lines (MOL), wherein a spatial discretization is chosen, and the quantities of interest are updated using time integration. Using the method of lines transpose (MOL^T), time discretization is first performed, and all spatial quantities are solved at a fixed time to perform the update, usually with boundary integral methods.

A recent method, successive convolution, combines a fast O(N) boundary solver with higher order Taylor expansions, to achieve new high order schemes for solving PDEs. The novelty is that higher order partial derivatives are approximated with stable convolution integrals.

Examples include hyperbolic and parabolic problems, on smooth geometries.