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# Alternating Direction Implicit Orthogonal Spline Collocation Methods for Time Dependent Problems

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Alternating direction implicit (ADI) orthogonal spline collocation (OSC) methods have proved to be effective techniques for solving multidimensional parabolic and second-order hyperbolic problems. In these methods, OSC, also known as spline collocation at Gauss points, is used for the spatial discretization, and the time-stepping is done using ADI methods based on the backward Euler method, the Crank-Nicolson method, or the second-order backward differentiation formula. The attraction of ADI-OSC methods is that they reduce a multidimensional problem to independent sets of one-dimensional problems similar to those arising in the OSC solution of two-point boundary value problems. We describe recent progress on the formulation and analysis of such methods for partial integro-differential equations (PIDEs). Results of numerical experiments demonstrate the efficacy of the new techniques for two classes of PIDEs. This is joint work with Amiya Pani and Ryan Fernandes.