

Space adaptive linearly implicit two-step peer methods for time-dependent PDEs

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In [GLPW(2009)] linearly-implicit two-step peer methods are successfully applied in the numerical solution of time-dependent partial differential equations. The computations were performed adaptive in time, but on a fixed spatial grid. However problems like the propagation of flame fronts are solved more efficiently when solved both adaptive in time and space. This talk addresses the fully adaptive solution of PDEs with linearly-implicit peer methods. We first discretize in time with linearly implicit peer methods and then discretize in space with linear finite elements. The error in time is estimated by an embedded solution of lower order, while the spatial error is estimated by the DLY error estimator based on hierarchical bases. We address the question of efficiency of the spatial error estimator and compare the performance of linearly implicit peer methods to Rosenbrock methods.

References

[GLPW(2009)] Alf Gerisch and Jens Lang and Helmut Podhaisky and Rüdiger Weiner High-order linearly implicit two-step peer-finite element methods for time-dependent PDEs *Applied Numerical Mathematics*, 59:624–638, 2009.