

Title: **Grid Stabilization of High-Order One-Sided Differencing. I; First-Order hyperbolic Systems.**

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One of the problems associated with the solution of differential equations by high-order finite difference schemes is that of the construction of boundary closures that can retain the order of the approximation and the stability of the numerical solution. In particular, problems involving wave propagation are very sensitive to the characteristics of the boundary closure.

Summation by parts methods [1] attempt to solve the problem by constructing boundary closures and modified inner products such that the discrete summation by parts formula holds. These methods results in an approximation order of the closure that is, at best, half the order of the internal approximation.

The authors attempt to resolve the problem by constructing grids with additional nodes such that they minimize the the spectral radius of the difference operator with stable boundary conditions.

Several numerical examples with constant and variable coefficients are detailed.

1. Mattsson, K. /itBoundary Procedures for Summation-by-Parts Operators, *J. Sci. Comput.*, vol. 18, no. 1, pp. 133–153, (2003).