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High-Order, Stable, and Conservative Boundary Schemes for Central and Compact Finite Differences PETER BRADY, DANIEL LIVESCU, Los Alamos National Laboratory — Stable and conservative numerical boundary schemes are constructed such that they do not diminish the overall accuracy of the method for interior schemes of orders 4, 6, and 8 using both explicit (central) and compact finite differences. Previous attempts to develop stable numerical boundary schemes have resulted in schemes which significantly reduced the global accuracy or required numerical dissipation for stability when applied to the non-linear fluid equations. We discuss a general procedure for the construction of conservative boundary schemes of any order followed by a simple, yet novel, optimization strategy which focuses directly on the compressible Euler equations. The result of this non-linear optimization process is a set of high-order, stable, and conservative numerical boundary schemes which demonstrate excellent stability and convergence properties on an array of linear and non-linear hyperbolic problems.

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