

LOW-DISSIPATION LOW-DISPERSION RUNGE-KUTTA SCHEME WITH AN IMPLICIT LAST STAGE

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High-order low-dissipation low-dispersion Runge-Kutta schemes (including three-order three-stage and four-order four-stage schemes) with an implicit last stage are proposed, based on an optimization that minimizes the amplification and phase errors for wave propagation. The new scheme can retain stable for high CFL numbers. Since only the last stage is implicit, the new scheme is more efficient than other optimized implicit Runge-Kutta schemes, such as the diagonally implicit Runge-Kutta scheme, the singly diagonally implicit Runge-Kutta scheme. The numerical applications contain the linear advection equation with oscillatory initial conditions and discontinuous initial conditions, and the one-dimensional Euler equations for shock tube problems.

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