

Multirate time integration of the Euler equations

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The simulation of atmospheric dynamics relies on the numerical solution of the Euler equations. These equations exhibit phenomena on different temporal scales. Sound waves propagate approximately ten times faster than the advective waves. An approach to overcome the CFL restriction caused by sound waves are split-explicit methods. By multirate techniques the terms relevant for sound waves are integrated by small time steps with a cheap time integration procedure, whereas the slow processes are solved by an underlying Runge-Kutta method using a larger macro step size. We construct such methods based on TVD-RK schemes and discuss order and stability properties.