

Dual time-stepping for time dependent low Mach flows

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We consider the effect of local preconditionings for the time dependent compressible Navier-Stokes equations. This includes both Jacobi and low speed preconditionings. The time dependent problems are solved using a dual time-stepping approach. We develop a scheme that uses the Jacobi preconditioning to accelerate the convergence of a Runge-Kutta multistage algorithm coupled with multigrid in an artificial time system. We also consider the effect of different sets of variables for both the accuracy and convergence. We check computationally the effectiveness of these preconditioners for both the steady state and time dependent problems.