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Authors: Tony Saad and James C. Sutherland

A HIGH-ORDER EXPLICIT PROJECTION METHOD FOR LOW-MACH REACTING FLOWS

Abstract

We present a new high-order explicit projection method for low-Mach reaction flows. The method supports second- and third-order Runge-Kutta integration and an arbitrary equation of state. Our approach solves a constant-coefficient pressure Poisson equation at each time-integration stage. Variable-density effects are represented in the right-hand-side of the Poisson system as a weighted combination of temporal density variations and momentum divergence. A key feature of our approach is that it enforces consistency between the density and thermochemical state at every integration stage. Finally, the approach is verified against analytical and manufactured solutions of the governing equations and is tested on a canonical variable-density jet.