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A priori **and** *a posteriori* **analyses of the flamelet/progress variable approach for supersonic combustion** AMIRREZA SAGHAFIAN, HEINZ PITSCH, Stanford University — A compressible flamelet/progress variable approach (CFPV) has been devised for high-speed flows. Temperature is computed from the transported total energy and tabulated species mass fractions and the source term of the progress variable is rescaled with pressure and temperature. The combustion is thus modeled by three additional scalar equations and a chemistry table that is computed in a pre-processing step. Three-dimensional direct numerical simulation (DNS) databases of reacting supersonic turbulent mixing layer with detailed chemistry are analyzed to assess the underlying assumptions of CFPV. Large eddy simulations (LES) of the same configuration using the CFPV method have been performed and compared with the DNS results. The LES computations are based on the presumed subgrid PDFs of mixture fraction and progress variable, beta function and delta function respectively, which are assessed using DNS databases. The flamelet equation budget is also computed to verify the validity of CFPV method for high-speed flows.

Amirreza Saghafian
Stanford University

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