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Including compressibility effect in combustion modeling for LES of supersonic combustion RONAN VICQUELIN, Ecole Centrale Paris, JOHAN LARSSON, JULIEN BODART, Stanford U. — Predicting scramjet performance requires accurate estimations of heat losses, wall friction and heat release distribution. The combustion modeling strategy is therefore important although most numerical simulations of these configurations use simple approximations to model the reactive flow. Two tabulated chemistry models are used here to perform LES of a model scramjet combustor. A wall model is used to compute heat losses and friction at walls. The first combustion model is based on non-premixed flamelets with a progress-variable approach. The compressibility effects of the flow on chemistry are taken into account by rescaling the progress-variable source term with ad-hoc laws. The second model extends the first chemical table by adding pressure and enthalpy dimensions, which enables to give a better estimation of the compressibility effect on the flame. LES results are compared to experimental data (OH LIF, OH* and pressure measurements) to assess the importance of dealing with compressibility effects in combustion models.

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