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Differential diffusion in tabulated chemistry: From model development to practical applications JASON SCHLUP, GUILLAUME BLANQUART, Caltech — Tabulated chemistry has been used to reduce the computational cost of chemistry and help close terms in the transport equations of Large Eddy Simulations. Various tabulated chemistry models utilize a single Lewis number in the progress variable transport equation to account for differential diffusion effects. In this work, a tabulated chemistry model is extended to include thermal diffusion coefficients and non-unity Lewis numbers for more than just the progress variable or fuel. A derivation of the model is given, and a wide range of lean hydrogen/air flame configurations are examined, including one-, two-, and three-dimensional flames under laminar and turbulent conditions. Comparisons of flame speeds, surface areas, source terms, and flame curvatures are done between the previous and new tabulated chemistry models, and a practical application of the tabulated chemistry method is considered in a low-swirl burner.

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