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Assessment of chemistry models for compressible reacting flows SIMON LAPOINTE, GUILLAUME BLANQUART, California Institute of Technology — Recent technological advances in propulsion and power devices and renewed interest in the development of next generation supersonic and hypersonic vehicles have increased the need for detailed understanding of turbulence-combustion interactions in compressible reacting flows. In numerical simulations of such flows, accurate modeling of the fuel chemistry is a critical component of capturing the relevant physics. Various chemical models are currently being used in reacting flow simulations. However, the differences between these models and their impacts on the fluid dynamics in the context of compressible flows are not well understood. In the present work, a numerical code is developed to solve the fully coupled compressible conservation equations for reacting flows. The finite volume code is based on the theoretical and numerical framework developed by Oefelein (Prog. Aero. Sci. 42 (2006) 2-37) and employs an all-Mach-number formulation with dual time-stepping and preconditioning. The numerical approach is tested on turbulent premixed flames at high Karlovitz numbers. Different chemical models of varying complexity and computational cost are used and their effects are compared.

> Simon Lapointe California Institute of Technology

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