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Rotational-Vibrational Raman Spectroscopy for the Measurement of Thermochemistry in Nonisobaric Flames ALEXANDER BAYEH, Texas A&M University - Aerospace Engineering, JULIA COSSE, University of Rochester - Mechanical Engineering, ADONIOS KARPETIS, Texas A&M University - Aerospace Engineering — The present work examines the feasibility of Raman line imaging spectroscopy for multiscalar measurements of thermochemistry in reacting flows under varying pressure. Line imaging of the rotational and vibrational Raman scattering was combined onto a single detector, thus allowing for a single-shot measurement of major species, pressure, and temperature in turbulent nonisobaric conditions. The diagnostic technique also allows for the calculation of two important derived quantities of interest, namely a conserved scalar and its dissipation rate. Additionally the present work introduces "canonical" flows that are optically accessible and involve high-speed, supersonic combustion with pressure variation. Small-scale, nonreacting supersonic underexpanded jets have been studied experimentally, using both a Schlieren system and the Raman line imaging technique, and computationally, using a method of characteristics approach.

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