



Velocity and Temperature Measurement in Supersonic Free Jets Using Spectrally Resolved Rayleigh Scattering

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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 30 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. The flow fields of unheated, supersonic free jets from convergent and convergent-divergent nozzles operating at $M 0.99$, 1.4 , and 1.6 were measured using spectrally resolved Rayleigh scattering technique. The axial component of velocity and temperature data as well as density data obtained from a previous experiment are presented in a systematic way with the goal of producing a database useful for validating computational fluid dynamics codes. The Rayleigh scattering process from air molecules provides a fundamental means of measuring flow properties in a non-intrusive, particle free manner. In the spectrally resolved application, laser light scattered by the air molecules is collected and analyzed using a Fabry-Perot interferometer (FPI). The difference between the incident laser frequency and the peak of the Rayleigh spectrum provides a measure of gas velocity. The temperature is measured from the spectral broadening caused by the random thermal motion and density is measured from the total light intensity. The present point measurement technique uses a CW laser, a scanning FPI and photon counting electronics. The 1 mm long probe volume is moved from point to...

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