resolved spectrum of a line-shaped Mg plasma and its distribution of densitogram as a function of the distance from the target surface are presented. The spectroscopic diagnostics of a PCS in line-shaped plasma measurement and its possible uses in an experimental x-ray laser investigation are also described.

CTuN69 Temporal scale measurements of number density fluctuations in the shear layer of free and acoustically driven axisymmetric jets using a two-pulsed laser scheme

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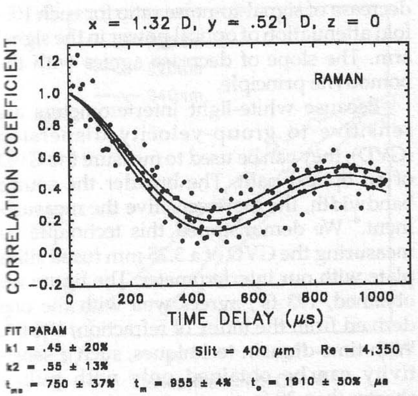
Temporal correlations of concentration fluctuations have been studied using both spontaneous Raman and Rayleigh scattering.[1,2] Two DCR-11 Nd:YAG pulsed lasers doubled to 532 nm were used to probe the mixing layer optically at an axial position of ≤2D from the jet orifice. The jet was provided by a ASME flat-top velocity profile nozzle with a 4.77-mm orifice. Vertical flows in still room air with exit Reynolds numbers of between 3,000 and 30,000 were studied. Gases used in the jet were CO_2, N_2, and air. The correlation coefficients could generally be well fitted to:

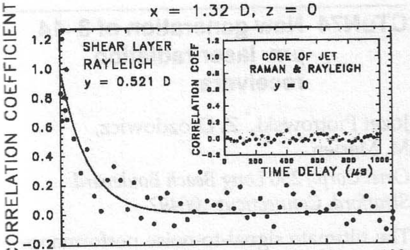
$$\rho(\tau) = K_1 \exp(-\tau/t_{mc}) \cos(2\pi\tau/t_m) + K_2\exp(-\tau/t_c)$$

where τ is the delay time between the reference laser pulse and the delayed laser pulse and the "ts" are the characteristic time scales. The free CO_2 jet scales were primarily of the damped cosine type, while the N_2 and air jets were essentially exponential. A typical recorded correlation coefficient is shown in Figure 1. The air-in-air measurements were carried out using Rayleigh scattering because the Raman fluctuations were uncorrelated due to the absence of mixing. In this case, the fluctuations of the Rayleigh signal are related to the fluctuations in the total number density, which can be seen as local pressure fluctuations. An example of this measurement is given in Figure 2. Thus, the time scales of the free jets ranged from a few microseconds to a millisecond depending on the Reynolds number and the type of jet. Acoustically-driven jets introduce a means for controlling the local mixing behavior. A review of the observed effects of changing the acoustic frequency and intensity will be presented.

1. P. P. Yaney, T. P. Grayson, J. W. Parish, 23rd Symposium (International) on Combustion, pp. 1877-1883 (1990).
2. J. W. Parish, P. P. Yaney, Proceedings of The Meeting on Combustion Fundamentals and Applications, Central States Section, The Combustion Institute, pp. 315-320 (April, 1992).



CTuN69 Fig. 1. Temporal correlation of concentration fluctuations in the shear layer of a CO_2 jet in air at Re = 4,350.



CTuN69 Fig. 2. Temporal correlation of the total number density fluctuations in the shear layer of an air jet in air at Re = 15,650.