FORTHCOMING PAPERS

Superhigh Resolution Spectroscopy in Methane with Cold Molecules

S. N. Bagayev, A. E. Baklanov, V. P. Chebotayev, A. S. Dychkov (USSR)

Use of optical selection of cold particles in saturated absorption spectroscopy is discussed. Owing to this we observed directly the splitting of a methane absorption line ($\lambda = 3.39$ μm) due to recoil effect in a light beam of 0.5 cm in diameter. The obtained width of nonlinear resonance of about 1 kHz corresponds to an effective temperature of particles of about 10^{-1}K. The new direct absolute frequency measurement of the central hyperfine component of the $F_2^{(2)}$ line in methane (7-6 transition) made under these conditions gave the following value 88,376,181,600.7 ± 0.5 kHz. The behaviour of the resonance intensity of saturated absorption in the transit-time conditions is analysed. It has been shown that with an absorption cell inside a cavity the saturation resonance intensity in the transit-time region increases sharply.

Two-Dimensional Visualization of the Flame Front in an Internal Combustion Engine by Laser-Induced Fluorescence of OH Radicals

R. Suntz, H. Becker, P. Monkhouse, J. Wolfrum (F. R. Germany)

Two-dimensional laser-induced fluorescence (2D-LIF) imaging of OH radicals, excited at 308 nm, has been employed to visualize the flame front in an internal combustion engine burning air/propane mixtures. Light sheet thicknesses down to 70 μm have been attained for excitation. Hydroxyl radicals were detected up to pressures of 7.5 bar at engine speeds of 500 rpm. An upper limit of 300 μm for the flame front thickness was obtained from line intensity profiles.

Spectral Density Analysis of Noisy Repetitive Pulses. Models for Continuously Operating Mode-Locked Lasers

B. Cunin, B. Geoffroy, F. Heisel, T. Lépine, J. A. Miehé (France)

A theoretical description and the interpretation of the power spectra of high-repetition-rate laser pulses showing fluctuations in time, intensity and shape are presented.

Multiple Relaxation and Inhomogeneous Broadening in Resonance Enhanced Raman Scattering: Application to Tunable Infrared Generation

J. C. Ryan, N. M. Lawandy (USA)

The solutions for the imaginary susceptibility of the Raman field transition with arbitrary relaxation rates and field strengths are examined for differing sets of relaxation rates with emphasis on alkali metal vapors which have spontaneous emission dominated relaxtion. The model is further expanded to include Doppler broadening and used to predict the peak gain as a function of detuning for a frequency doubled alexandrite laser-pumped cesium vapor gain cell.

Studies of Vibrational Relaxation in CDF_3 Following Intense Laser Excitation

E. M. Alonso, R. J. D'Angelo, E. J. Quel (Argentina)

The V-T/R relaxation time of CDF_3 was measured studying the laser-induced infrared fluorescence emitted by vibrationally excited CDF_3. Following excitation by the 10*R*(12) line of a TEA CO_2 laser infrared fluorescence has been detected without spectral resolution in the 1100—700 cm^{-1} range. A decay rate of 28.8 ms^{-1}. $Torr^{-1}$ was obtained for pure CDF_3 when it is excited with a fluence of 390 mJ/cm^2. Measurements have also been made in the presence of different bath gases (He, Ne, Ar, Xe, and CHF_3).

Large Area X-Ray Preionizer for Electric Discharge Lasers

T. Letardi, P. Di Lazzaro, G. Giordano, C. E. Zheng (Italy)

A pulsed x-ray source with a pulse duration of 250 ns (FWHM) which uses plasma cathodes to supply sufficient electrons for emission is described. It is simple to construct and requires low energy input. Less than 14 J of energy can produce up to 10^7 electron-ion pairs/cm^3 in a 10 l volume of neon at 1/atm.

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