FORTHCOMING PAPERS

Picosecond Third-Harmonic Light Generation in Calcite

A. Penzkofer, F. Ossig, P. Qiu (F. R. Germany)

The third-harmonic generation of picosecond light pulses in a calcite crystal is studied experimentally and theoretically. A passively mode-locked Nd:phosphate glass laser is used in the experiments. The third-order nonlinear susceptibility components and the effective third-order nonlinear susceptibility of type II phase-matched (ooe→e) third-harmonic generation are determined.

Laser Induced Thermal Profiles in Thermally and Optically Thin Films

F. Bloisi, L. Vicari, P. Cavaliere, S. Martellucci, J. Quartieri, P. Mormile, G. Pierattini (Italy)

The temperature field generated by the weak absorption of a gaussian laser beam in an optically and thermally thin film bounded by two transparent plates is discussed. An analytical solution of the problem is presented together with an algorithm for the numerical integration. The influence of the finite thermal conductivity of the plates is shown in an example.

Laser Action on Resonant Molecular Flows Through Capillaries

I. Ursu, R. Alexandrescu, V. Drăgănescu, C. Grigoriu, Î. N. Mihăilescu, I. Morjan (Romania), A. M. Prokhorov, N. V. Karlov, A. S. Lagutchev, A. N. Orlov, Yu. N. Petrov (USSR)

New experimental results are reported pointing to the possibility of a laser control of the resonant gases transit through capillaries in the Knudsen and intermediate regimes

Relative Time Parameters Characteristic of Optogalvanic Responses

N. Yackerson (Israel)

New optogalvanic response relative time features, such as signal growth and decay speeds, are suggested. These criteria can characterize signal time response parameters, as well as determine which particular type of gas internal quantum process is dominant during a given stage of response development. The general theoretical concepts reported here are compared with experimental results which are based on resonant optogalvanic effects in neon discharges and on non-resonant optogalvanic signals in neon and argon prebreakdown discharges. These new time characteristics are conceptually pleasing and permit study of the influence of individual factors such as bias and incident laser irradiation on overall gas response.

Gain-Switched Semiconductor Laser Amplifier as an Ultrafast Dynamical Optical Gate

E. Schöll, K. Ketterer, E. H. Böttcher, D. Bimberg (F. R. Germany)

A gain-switched semiconductor laser is shown to act as an optical gate with picosecond resolution and amplification for light pulses from another laser source. The amplification mechanism and the gate width change qualitatively when the gate laser undergoes a transition from a pumping rate slightly below the dynamic laser threshold to slightly above the dynamic threshold. If the gate laser is pumped below but close to its dynamical threshold, unsaturated amplification of an external signal pulse occurs over a delay time range between the external optical pulse and the electrical driving pulse of about 100—200 ps which is equivalent to the optical gate width. The signal amplification is observed to increase by two orders of magnitude and the gate width decreases by one order of magnitude if the gate laser is pumped slightly above the dynamical threshold. Amplification then occurs for input signals injected much earlier. A detailed theory of coherent, time-dependent amplification including the nonlinear dynamics of the semiconductor laser is shown to account for the observations. Both amplification regimes, below and above threshold, are reproduced in the numerical simulations. The extremely short and highly sensitive gate range above threshold is identified as being due to the gain maximum related with the first relaxation oscillation of the laser.

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