distribution and overlapping of a pump beam, Stokes and laser modes, recombination and thermalization within laser manifolds of activators in active media, and features of absorber saturation and recovering in inhomogeneous optical field.

For Nd:LSB-Cr:YAG-$Ba(NO_3)_2$ microchip-lasers with different saturable absorbers and output couplers the theoretical results agree very well with wide set of experimental data on sub-nanosecond Stokes pulse dynamics. The Stokes and laser pulses build-up and their temporal and power characteristics have been described and discussed. The model explains the interplay of pump, Stokes and laser mode inhomogeneity, thermalization and cavity design in microchip-laser dynamics and makes it possible to optimize pulse parameters.

THERMALIZATION-TIME DETERMINATION FROM EXPERIMENTAL AND THEORETICAL INVESTIGATION OF Q-SWITCHED MICROCHIP-LASER DYNAMICS

S. V. Voitikov[1], L. E. Batay[1], M. B. Danailov[2],
A. A. Demidovich[3], A. N. Kuzmin[4]

[1] B. I. Stepanov Institute of Physics, NASB, Minsk, Belarus
[2] Laser Lab., Sincrotrone-Trieste, Italy
[3] Institute of Molecular and Atomic Physics, NASB, Minsk, Belarus
[4]University of Buffalo, The Institute for Lasers, Photonics and Biophotonics, USA

Sub- and nanosecond dynamics of Q-switched solid-state lasers depends strictly on thermalization within upper and lower laser manifolds of activator atoms in active media, since thermalization times are believed to be of the same time scale. Thermalization drives manifold populations towards their equilibrium Boltzmann distributions and could effectively reduce / replenish the upper laser level population if the pulse duration is shorter / longer then the corresponding thermalization time. Thermalization within the lower laser manifold results in relatively fast lower-laser level depopulation. Both processes affect directly the temporal and power parameters of laser pulses and make it necessary to accurate determine the thermalization times.

From comparison of experimental and based on the developed generalized laser model theoretical investigation of sub-nanosecond pulse dynamics of Nd:LSB-Cr:YAG microchip-lasers it has been shown for the first time that thermalization times are 0.4 to 0.8 ns and 0.2 to 0.5 ns for the upper and lower laser manifolds of Nd:LSB respectively.