

Numerical simulation of the processes in fast flow gas discharge CO₂ lasers

Galeev R., Safiulline R.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

In the report the results of numerical simulation of the processes in discharge chambers (DC) of fast flow CO₂ lasers, are presented. The investigations for longitudinal glow discharge (quasi-one-dimensional and two-dimensional flow) using four- and six-temperature models, were performed. Distributions of gas dynamic quantities, densities of charged particles, electric field strength, as well as vibrational temperatures of CO₂, N₂ and CO species, within the DC were calculated. Quasi-one-dimensional consideration of processes for powerful CO₂ lasers with conic discharge tubes has shown that narrowed along the gas flow tubes must be more effective for laser operation than cylindrical ones. The calculated quantities are in satisfactory agreement with available experimental data.

<http://dx.doi.org/10.1117/12.563005>

Keywords

CO₂ laser, Conic tube, Discharge chamber (DC), Output power