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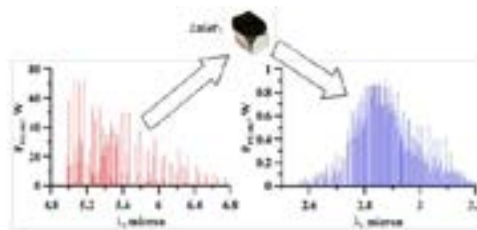
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Frequency conversion of slab Q-switched CO laser with RF discharge pumping in ZnGeP₂ crystal

Andrey Kozlov

P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Russia

Slab CO laser with radio frequency (RF) pulse-periodic pumping and cryogenically cooled electrodes was launched in Q-switch mode. V-type optical scheme with two passes through the active medium was used. Q-switch mode was realized by rotating mirror. RF discharge parameters, composition and pressure of the laser gas mixture were optimized to increase the laser output pulse peak power. Laser pulse parameters were studied depending on the time delay between RF pumping pulse and Q-switching moment. The influence of output coupler transparency and RF pumping parameters on CO laser output spectrum was defined. Consequently, laser pulses with a repetition rate of 100 Hz, pulse duration of 0.65 μ s (FWHM) and maximum peak power up to 3.5 kW, which is significantly higher (about two orders of magnitude) than the peak power of the same CO laser operating in the free-running mode at similar pumping conditions, were obtained. Laser spectra consisted of ~90 lines in wavelength range from 4.9 to 6.7 μ m. The obtained CO laser pulses were used for the second harmonics and sum frequency generation in a nonlinear crystal ZnGeP₂. Conversion efficiency was determined depending on radiation incidence angles and position of crystal relative to the focal plane of the focusing lens. Maximal value of external conversion efficiency was ~3%, which corresponding to internal conversion efficiency ~6%. The spectrum of converted radiation under these conditions consisted of ~200 spectral lines in wavelength range from 2.5 to 3.3 μ m.



Biography

Andrey Kozlov graduated from National Research Nuclear University MEPhI (Moscow Engineering Physics Institute) in 2002 in specialty Solid State Physics. Since 2001, he works in the research group "Molecular Gas Lasers", Gas Lasers Laboratory in P N Lebedev Physical Institute of the Russian Academy of Sciences. He has published over 60 scientific papers with his participation, including a patent of the Russian Federation. He took part in creation of compact laser with a slab RF discharge excitation and cryogenic cooling of the active medium, operating both on fundamental and first overtone bands of CO molecule. Nowadays, he participates in a parametric study of this laser, as well as in researches of capabilities of frequency conversion of CO laser radiation in nonlinear crystals.

akozlov@sci.lebedev.ru

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