Annotation to the diploma of Aleksei Konjashkin

Peculiarities of generation and amplification of diode pumped Nd:YAG picosecond laser

The aim of diploma is the estimation of focal length of thermal lens arising in active element depending from the diode pump pulses rate and energy. The results of this work are used in elaboration of picosecond Nd:YAG laser with pump change rate from 1 Hz to 1000 Hz. The next aim was the calculation and adjustment of compact two pass amplifying system and comparison of the characteristics of two amplifiers of picosecond pulses with lamp and diode pump.

In terms of this work were made calculations of the result thermal field arising in active element of impulse Nd:YAG laser for different diode pump pulses rate. Estimations of thermal lenses were made. Also the scheme of two pass amplifiers with lamp and diode pump was adjusted.

The main results of this work are:

For different diode pump pulses rate in the interval from 1 Hz to 1000 Hz thermal fields, arising in active element. The maximum temperature was estimated: 23.75 C° for 1 Hz and 55 C° for 1000 Hz (initial temperature 23.7 C°).

On the basis of this results the mean focal lengths of the thermal lens were estimated: for 50 Hz $< f >$ = 220 m, for 1000 Hz $< f >$ = 7 m.

For two configurations using lamp pumped and diode pumped amplifiers were measured coefficients of amplification:10 for diode pumped, 220 for lamp pumped. Efficiency of amplification η also was calculated: $4.38 \cdot 10^{-2}$ % for diode pumped, 1 % for lamp pumped amplifiers.