Operation characteristics of picosecond diode pumped Nd:YAG laser at thermal effects manifestation

Abstract.

The diploma work is devoted to experimental study of thermo-optical effects and their influence on operational characteristics of pulsed-diode-pumped and electro-optically controlled picosecond laser. The work is aimed on calculation and appropriate compensation of laser output distortion attributed to thermal effects, on pump radiation spectrum and geometry optimization and on improvement of operation stability.

Thermal lens characteristics: focal length, aberrational coefficients at different pump repetition rate were measured for two different active element and laser mirror disposals. Special heat sink design for active element was developed. Active element temperature and its leveling dynamics were measured at different cooling modes (passive heat-sink, heat-sink with air-blower, water-cooling) and pump repetition rates.

On the basis of data obtained the optimal oscillator configuration was selected, which provides stable and steady laser operation in a wide repetition rate range (up to 400 Hz).

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