

123(19) kW passively Q-switched Nd:YLF laser operating at 1053 nmAlessandro M. Deana*Universidade Nove de Julho - SP - Brasil*

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To obtain high power, short Q-switched pulses of the order of 10 ns, diffraction limited high beam quality and high rep rates is still a major goal in laser cavity design. Several diode-pumping schemes are nowadays employed. Among the most used designs there are the longitudinal pumping and side pumping. The first scheme shows some restrictions with respect to power scaling of the TEM_{00} mode due to thermal effects and the second usually has poor beam quality. Only few power scalable configurations exist that permit good beam quality and high efficiency with side-pumping. Most of these are complex MOPA (Master Oscillator Power Amplifier) configurations with EO Q-switching. This work reports a 123(19) kW Nd:YLF side pumped, passively Q-switched TEM_{00} laser with 9.2(10) ns pulse duration emitting at 1053 nm. We used a 34 W TM-polarized diode operating at 797 nm that was focused into the crystal by a $f = 2.5$ cm spherical lens, resulting in a spot size of approximately 4 mm x 0.1 mm in the horizontal and vertical directions, respectively. Fundamental mode oscillation was extracted with a TEM00 mode beam waist radius of 0.48 mm inside the crystal by using a folding mirror with 3 m radius of curvature, a plane end mirror, a plane output coupler with 40% transmission and a separation of 1.6 mm to 1.9 mm between both beams inside the crystal. The Cr:YAG saturable absorber initial transmission is 50%. To avoid damage to the active medium due to thermal load, the diode was pulsed with no longer than 1ms pulse duration and up to 7% duty cycle. The laser energy ratio with/without saturable absorber is 32.8(17)%, showing a good energy transfer from a QCW condition to Q-switching.