

다이오드 펌핑된 파장변환 이차조화파 소형 레이저의 공진기
최적화 모델링에 관한 연구

Modeling of Cavity Optimization for Diode Pumped Green
Miniature Laser by Frequency Doubling

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Diode pumped solid-state (DPSS) lasers⁽¹⁾ in the visible spectral region are efficient, compact, and robust light sources for various applications, such as optical data storage, material processings, spectroscopy and laser displays. Intracavity second-harmonic generation (SHG) is a promising approach for frequency doubling because the power densities within the cavity are high and hence high conversion efficiencies can be realized.

We designed an end-pumped intracavity laser using Nd:YAG as a laser medium and LBO as a frequency doubling medium. A simple model⁽²⁾ was developed to optimize the cavity parameters, such as cavity length, pump beam intensity and diameter, and the position of the SHG crystal. Temperature profiles of the Nd:YAG disk were calculated, and the resulting thermal lens effects and the cavity stability were evaluated in association with the laser cavity length. Theoretical analysis showed a good agreement with experimental results.

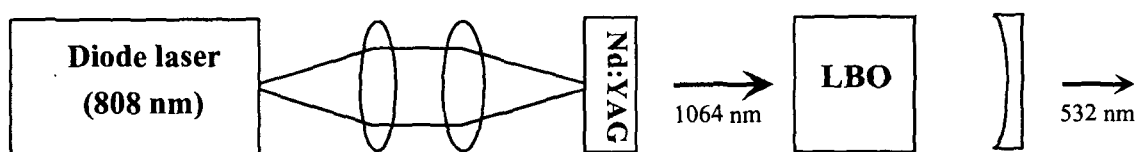


Fig. 1. Schematic diagram of diode pumped green laser.

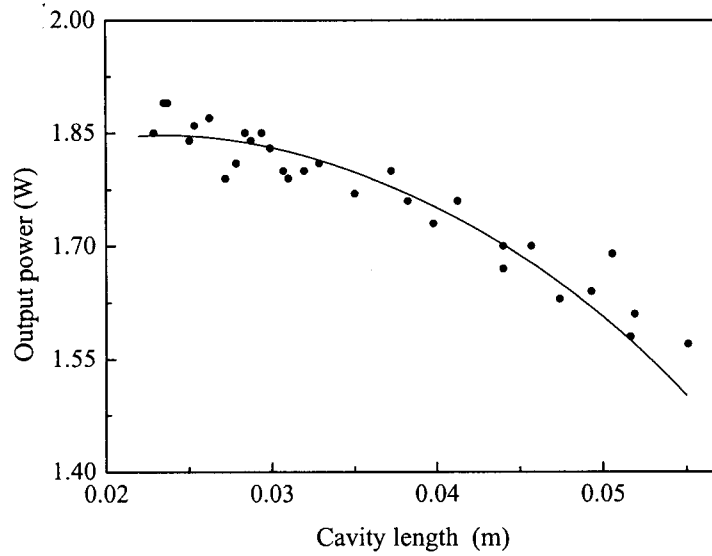


Fig. 2. Green output power as a function of cavity length.
solid circle : experimental data, solid line : theoretical data

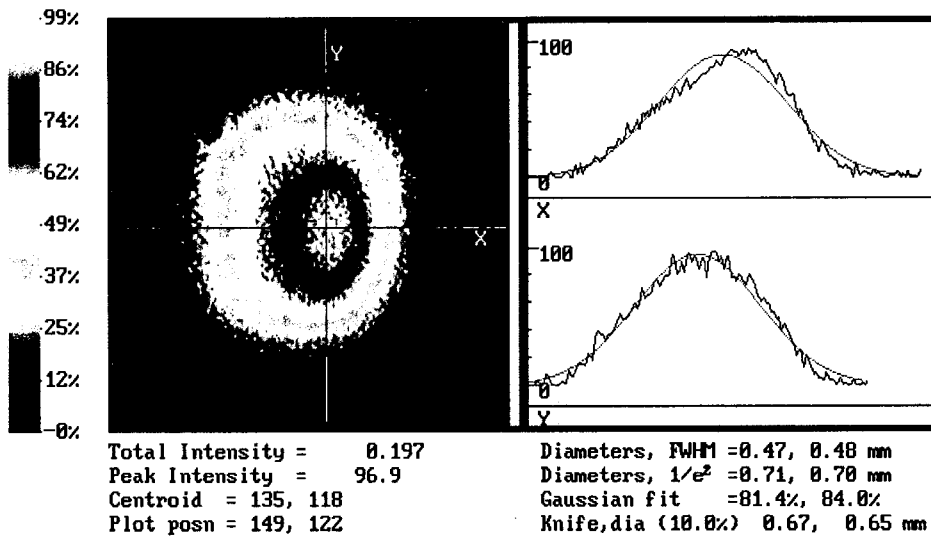


Fig. 3. Transverse mode of the green laser output.

Reference

- (1) J. J. Zayhowski and J. Harrison, "Handbook of Photonics: Chap. 8", 326, CRC Press (1997).
- (2) D. Shen, A. Liu, J. Song and K. Ueda, "Efficient operation of an intracavity-doubled Nd:YVO₄/KTP laser end pumped by a high brightness laser diode", Appl. Opt. 37, 7785 (1998).