

## 激光物理与激光器件

### 抽运光分布对圆截面激光晶体热变形的影响

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摘要:

为了简化激光晶体中热变形量的求解过程,分析抽运光分布对激光晶体热变形的影响,采用圆截面激光晶体热变形量的简便计算方法,并取抽运光束为超高斯光束,通过理论推导和数值计算,研究了抽运光强度分布对圆截面激光晶体热变形的影响。结果表明,晶体端面热变形量与半径为3次多项式关系,当抽运光阶次大于2时,随着阶次的增大,晶体端面的热变形量逐步减小。这一结果对全固态激光器的设计有一定帮助。

关键词: 激光物理 晶体热变形量 简便计算方法 圆截面激光晶体 超高斯光束

### Effect of pumping light distribution on thermal distortion of laser crystal with circular cross-section

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Abstract:

All solid-state lasers have many applications. The thermal effect of laser crystal is one of the main factors affecting the performance of laser. Usually, the temperature field distribution in crystal is found, and then the thermal distortion of laser crystal is calculated. This process is tediously long and includes some repetition. In order to simplify the solution finding process for analyzing the influence of pumping light distribution on thermal distortion, a simplified method was proposed to compute the thermal distortion of laser crystal with circular cross-section taking the pumping as super-Gaussian beam. It is found that because of thermal distortion, the pumped end of laser crystal becomes a rotational curved surface with power 3. As the rank of pumping super-Gaussian beam increases, the thermal distortion of crystal pumped-end decreases. The result is helpful for solid-state laser design.

Keywords: laser physics thermal distortion of crystal simplified method laser crystal with circular cross-section super-Gaussian beam

收稿日期 2013-01-15 修回日期 2013-02-28 网络版发布日期 2013-07-25

DOI: 10.7510/jgjs.issn.1001-3806.2013.05.018

基金项目:

陕西省自然科学基金资助项目(2011JM8022)

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