High-Average Power Disk Laser Face-Pumped by 2D-Stack Diode Arrays

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The progress in the development of the large-aperture Nd:YAG disk laser face-pumped by 2D-stack diode arrays was presented. Over 3kW average power with the beam quality less than 10 times diffraction limitation was achieved by adopting a conventional pumping optics designs and improving the technique of the gain medium mounting with the water cooler.

Most high average-power laser applications require good beam quality. Thin disk laser is the most successful design to overcome the degradation of the beam quality caused by the gain medium's thermal effects and was well developed over past few years, which have many advantages in beam quality keeping and power scalability over the traditional rod and slab laser. There are several different concept of disk laser according to the different way of thermal dissipating and pumping, such as the thin disk laser, compact active mirror laser (CAMIL), diamond cooling disk laser and spinning disk laser. We summarized the progress of the different type disk laser and analyzed its technical advantages, restrictions and developing potential.

In the paper our recent progress in the development of the large-aperture Nd:YAG disk laser face-pumped by 2D-stack diode arrays was presented. Over 3kW average power with the beam quality less than 10 times diffraction limitation was achieved by optimizing the pumping optics designs and improving the gain medium mounting technique. Finally a novel design of thin Zigzag slab laser, which used composite Nd:YAG crystal and the similar cooling technique to the disk laser, and experimental results were presented.

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