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Mode Engineering of High Power Semiconductor Lasers

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High power semiconductor lasers are well established laser sources for a variety of applications, such as pump of solid state lasers and fiber lasers, material processing, medical treatment, space telecommunication and display technology. However, semiconductor lasers still suffer the drawbacks of far–field properties, including high divergence, ellipse beam, poor beam quality and injection sensitive far–field. In this talk, the approaches to engineer the modes in vertical and lateral direction of inner cavity and external cavity to improve the far–field properties were presented. These approaches lead to the significant improvement of beam quality and brightness of high power semiconductor lasers. Bragg reflection waveguide was used to control the vertical mode and low divergence (<5°) semiconductor laser with circular beam was demonstrated. The microstructures were used to engineer the lateral modes and high power low lateral–divergence broad–area semiconductor laser with injection insensitive far–field was realized. In the mode engineering of external cavity for the purpose of power scaling, several approaches were invented to break the beam–quality limitation of beam combining.

SHORT BIO:

Tong Cunzhu is currently a professor of Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), and is the executive deputy director of State Key Lab of Luminescence and Applications. He received his PhD degree in Microelectronics from Chinese Academy of Sciences (CAS), and was the senior member of IEEE. He won the Outstanding Young Scientist Award, the Excellent Award for Hundred Talents Program of CAS, the Important Achievements in China Optics 2015, and Wang Daheng Optical Award. He has authored and co–authored 100 refereed journal papers and 17 patents. His current research interests include the high beam–quality semiconductor lasers, beam combining, and semiconductor disk lasers.

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