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激光物理与激光器件

基于椭圆形反射镜面的扇形半导体微环激光器

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摘要: 为了设计新型基于椭圆形反射镜面的扇形半导体微环激光器, 采用光线追迹和有限时域差分的方法进行了理论分析和设计仿真。与普通的三角形环形腔相比, 由于引入了椭圆形反射镜面, 使得这种新型的微腔的镜面反射损耗极低, 仅为1%, 功率传输率为93%, Q 值极高, 在1576.36nm谐振波长处, Q 值达到了23318.6。结果表明, 这种新型的微环激光器有利于实现方向双稳态, 并可进一步用于全光信号处理领域。

关键词: 激光器 微环激光器 椭圆形谐振腔 三角形环形腔 有限时域差分 光线追迹

Fan-shaped semiconductor micro-ring lasers based on an elliptical reflector mirrors

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Abstract: In order to design a novel fan-shaped semiconductor micro-ring laser based on an elliptical mirror reflector, ray tracing and finite-difference time-domain method were applied to approach theoretical analysis and design simulation. Compared with the common triangular ring cavity, due to the introduction of the elliptical mirror reflector that the specular reflection loss of this new micro-cavity is very low (1%), the power transmission rate is 93% and the high Q value is also achieved. At the resonance wavelength of 1576.36nm, Q value reaches 23318.6. The results

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show that this novel type of micro-ring laser has a bigger chance to exhibit directional bistability, and can be further used to the field of all-optical signal processing.

Keywords: lasers micro-ring laser elliptical cavity triangular ring cavity finite difference time domain ray-tracing

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