脉冲调制半导体激光器研究

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摘　要：脉冲调制半导体激光器拥有体积小、效率高、可直接用电调制、易于集成等优点，其产生的高质量激光在光纤通信系统、激光测距、激光打印等众多领域有着广阔的应用前景，并因此而备受人们关注。同时由于其对工作电流质量和温度要求较高，所以半导体激光器的驱动电源也成为了一个热点，并得到了深入与广泛的研究。

本设计研究了脉冲调制半导体激光器的工作原理和特性，并为其设计了驱动电源，加载上半导体激光器后组成了整机。本设计所制作的驱动电源整机集恒流驱动器、脉冲驱动器和温度控制系统于一体，输出的恒定电流稳定且大小可调，纹波系数只有 49.7ppm；输出的电流脉冲脉宽最小可达 13.62ns，峰值可达 2A，重复频率 1~100KHz 可调。该驱动电源不仅性能优越，而且性价比高，具有一定实用性。

关 键 词：脉冲调制；半导体激光器；恒流驱动；温度控制

Research of Pulse Driver-Modulated Semiconductor Laser

Abstract: Pulse driver-modulated semiconductor laser has advantages of small size, high efficiency, can be directly used for power modulation, easy integration and so on. The high quality laser which has a wide application prospect in many fields included optical fiber communication system, laser ranging, laser printing, and thus attracted much attention. At the same time because of its high quality of the operating current and temperature requirements, the semiconductor laser drive power has become a hot spot, and get an in-depth and extensive research.

The design study of the working principle and characteristics of the pulse-modulated semiconductor lasers, and to design a power supply included the semiconductor laser. The semiconductor laser driver consisting of the constant current driver, pulse driver and temperature control system is accomplished. The constant current output is stable and adjustable, its ripple coefficient of only 49.7ppm. The output current pulse which width minimum achievable 13.62ns, peaks up to 2A, and repetition frequency 1 ~ 100KHz adjustable.

Key words: Pulse driver-modulated; semiconductor laser; constant current driver; temperature control

教师点评：本文对脉冲调制半导体激光器做了深入的研究，并设计出了性能优越，实用性好的半导体激光器驱动电源。恒流输出稳定，纹波系数可达 49.7ppm。输出脉冲脉宽最小可达 13.62ns，峰值可达 2A。

论文选题具有较好的应用价值和创新性，难度偏难，文献材料收集翔实，工作量饱满，设计合理，方案可行，数据合理，书写规范，条理清晰。值得一提的是该同学从大二开始就积极进入实验室参与实验项目，通过两年多的锻炼学习，理论基础扎实，具有较强的实验技能，目前已初步形成独立分析问题、解决问题的科研能力，毕业设计中，工作努力，积极认真、很好地完成了毕业设计任务,是篇优秀的毕业论文。