高功率线偏振脉冲光纤激光器的研究

电子科学与技术学院（电子科学与技术）梁小燕

（学号：2011160224）

指导教师：郭春雨

摘要：因为其很高的光束质量、散热快速方便、结构紧凑简单等优点，高功率脉冲光纤激光器在各领域具有更重要的应用，现在激光焊接、加工、打标、医疗和武器等民用及军事领域都可见其身影。而在倍频等应用需要线偏振激光光源，所以线偏振输出的脉冲光纤激光器具有很大的应用前景和研究意义。

本项目研究了一种基于可饱和吸收体被动锁模的 SESAM 锁模脉冲光纤激光器，产生重复频率为 26.3 MHz、中心波长为 1064 nm、光谱宽度为 1.45nm、脉冲宽度为 11.2ps、平均功率为 10.9mW 的锁模脉冲。并作为种子源，对其进行四级 MOPA 高功率放大，最终获得重复频率为 105.2MHz、中心波长为 1065.0nm、光谱宽度为 8.3nm、脉冲宽度为 11.2ps、输出功率为 10.02W 的高功率线偏振脉冲激光输出。

关键词：高功率；短脉冲；线偏振；SESAM 被动锁模；MOPA 主振荡功率放大器。

The research of high power linear polarized pulsed fiber laser

Abstract : Because of its high quality light beam, convenient heat dissipation, compact and simple construction, high power polarized pulsed fiber lasers have been increasingly investigated for a wide scope of their possible applications in the Civilian and military area, for example, Laser processing, laser marking, laser welding, laser medical treatment, and laser weapons and so on. And linear polarization laser light sources are needed in application of the field of frequency doubling and nonlinear frequency conversion, so the research on the high power polarized pulsed fiber lasers has a huge significance and application prospect.

Our project investigated a kind of SESAM mode-lock pulse fiber laser based on passive mode-lock, which can generate mode-lock pulse with its frequency of 26.3MHz, its center-length of 1064nm, its width of 1.45nm, its pulse-width of 11.2ps, its average power of 10.9mW. We take it as a seed and then amplified it with 4 level MOPA high power amplifier to generate high power polarized pulse laser output with its frequency of 105.2MHz, its center-length of 1065.0nm, its width of 8.3nm, its pulse-width of 11.2ps, its power of 10.02W.

Key words: high power; ultra-short pulse; polarized; SESAM mode-lock; MOPA high power amplifier.

教师点评：论文采用可饱和吸收体被动锁模技术，实现了稳定线偏振脉冲光纤激光器，输出功率是 10.9mW，重复频率是 26.3MHz，通过四级主振荡功率放大实现了全光纤化的高功率脉冲光纤激光器的研制，最大输出功率是 10.05W。

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。该同学理论基础扎实，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、较好地完成了毕业设计任务，是篇优秀的毕业论文。