

氧化石墨烯锁模光纤激光器非线性动力学研究

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摘 要: 使用基于氧化石墨烯可饱和吸收体的被动锁模掺镱光纤激光器, 通过调节PC和泵浦功率实现锁模, 其中调节PC是相当于改变激光的增益带宽, 从而控制腔内损耗, 等效于改变泵浦功率和光增益, 从而实现多脉冲的不同运行状态。实验获得了基频锁模脉冲、准谐波锁模脉冲、谐波锁模脉冲、多脉冲序列、周期性调制序列与混沌多脉冲现象。分析了氧化石墨烯在各领域特别是光纤激光器锁模上的应用情况和前景。本实验有利于加深对氧化石墨烯锁模光纤激光器非线性动力学的理解。

关 键 词: 氧化石墨烯; 掺镱光纤激光器; 被动锁模; 非线性动力学

Experimental studies of non-linear dynamics in a passively Ytterbium-doped fiber laser based on graphene-oxide saturable absorber

Abstract: The different multiple pulses phenomena were experimentally studied in a passively mode-locked ytterbium-doped fiber laser based on graphene-oxide saturable absorber with net normal dispersion cavity. with different pump power and polarization orientations, we observed the multiple pulses phenomena, including harmonic mode-locking pulses, quasi-harmonic mode-locking, periodical peak modulation and chaotic multipulse. The inserted 2 nm narrow bandwidth filter is important for limiting the gain bandwidth and shaping pulses. Adjusting the polarization controller is compared to change the gain in the laser cavity, which is the main reason for the formation of different multiple pulses states. These results could extend the understanding of multiple pulses dynamics in GOSA mode-locked fiber lasers.

Key words: Graphene-oxide; Ytterbium-doped fiber laser; passive mode-locking; non-linear dynamics

教师点评: 本文基于氧化石墨烯可饱和吸收体实现了被动锁模掺镱光纤激光器, 并通过调节偏振控制器实现不同形态脉冲输出, 获得了基频锁模脉冲、准谐波锁模脉冲、谐波锁模脉冲、多脉冲序列、周期性调制序列与混沌多脉冲现象。论文撰写规范, 表述清晰严谨, 是一篇优秀的毕业论文。