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光纤技术

色散补偿和色散位移光纤实现光脉冲压缩

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摘要 根据超短光脉冲在光纤中传输的非线性薛定谔方程，
模拟了不同色散参量情况下色散补偿和色散位移光纤对增益开关半导体激光器产生的光脉冲的压缩，
给出了光脉冲在经过色散补偿光纤前后的啁啾曲线。结果表明，使用色散参量D分别为-150，-180和-20ps/(nm·km)的色散补偿光纤可以实现其他脉冲压缩方法的压缩效果，最大压缩因子达到6.09，但色散参量越大，
所需光纤长度就越短。此外，
脉冲经过色散补偿光纤后线性啁啾几乎为零。还利用色散位移光纤对脉冲进行孤子压缩，脉冲宽度由最初的45ps减小到1.23ps。指出采用这2种光纤相结合的方法可以对光脉冲实现高效压缩。

关键词 光脉冲压缩 分步傅里叶 色散补偿光纤 色散位移光纤 增益开关

分类号

Light pulse compression implemented by dispersion compensation fiber and dispersion shifted fiber

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Abstract According to the nonlinear Schro¨dinger equation on picosecond pulse transmission in optical fiber，the pulse compression at 1553 nm in dispersion compensation fiber and dispersion shifted fiber were studied with numerical method. Three different dispersion values were simulated and compared. The chirp curves of the pulse before and after dispersion compensation fiber are given. As a result, the optical pulse from gain switched distributed feedback laser diode can be compressed from 45.00 ps to 7.39 ps by dispersion compensation fibers, and the larger the fiber dispersion value is, the shorter the fiber is needed to achieve the same compression effect. The pulse was further compressed using dispersion shifted fiber from 7.39 ps to 1.23 ps with fiber dispersion value of 6.0 ps/(nm·km). The results indicate that optical pulse can be compressed very efficiently with dispersion compensation fiber and dispersion shifted fiber in the two consecutive modes.

Key words pulse compression split step Fourier dispersion compensation fiber dispersion shifted fiber gain switching

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