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论文

飞秒孤子在色散渐增光纤中谱压缩的数值分析

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摘要:

通过数值求解修正了的广义非线性薛定谔方程,研究了孤子在色散渐增光纤中的谱压缩进程.详细分析了入射脉冲峰值功率对输出脉冲的谱宽和中心波长的影响,并描述了脉冲的脉宽、谱宽及啁啾在光纤中的演化过程.计算结果表明,脉宽200 fs、中心波长1 550 nm的基孤子在群速度色散从-1 ps²/km 至-11 ps²/km线性变化的长100 m的色散渐增光纤中传输时,脉冲谱宽由12.6 nm压缩至5.2 nm,即可获得最大压缩比为2.42.

关键词: 光纤光学 谱压缩 色散渐增光纤 基孤子
非线性薛定谔方程

Spectral Compression of Femtosecond Soliton in a Dispersion-increasing Fiber

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Abstract:

The spectral compression performance of the fundamental soliton in a dispersion-increasing fiber is investigated through numerically solving the

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generalized nonlinear Schrödinger equation. The influence of the input peak power on the output spectral width and the output center wavelength is analyzed, and the evolution of the pulse width, the spectral width and the chirping in the fiber are described. The calculation results show that spectral compression from 12.6 nm to 5.2 nm, i.e. spectral compression rate of 2.42, can be realized for the fundamental soliton with the pulse width of 200 fs and the center wavelength of 1 550 nm propagating in the dispersion-increasing fiber with the length of 100 m whose group-velocity dispersion parameter linearly varies from $-1 \text{ ps}^2/\text{km}$ to $-11 \text{ ps}^2/\text{km}$.

Keywords: Fiber optics Spectral compression
Dispersion-increasing fiber Fundamental soliton
The generalized nonlinear Schrödinger equation

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