

## 非线性光学

### 高非线性光子晶体光纤中超连续谱产生的特性研究

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#### 摘要:

利用数值方法求解广义非线性薛定谔方程,数值模拟了光脉冲在高非线性光子晶体光纤正常色散区超连续谱产生的演化,研究和分析了脉冲参数如峰值功率,脉冲宽度及初始频率啁啾对超连续谱形成的影响.结果表明,当脉冲峰值功率一定时,随着传输距离增大,超连续谱随之愈宽,平坦度愈好;随着脉冲峰值功率逐渐增大,超连续谱随之更宽,平坦度有所劣化.相反,脉冲宽度逐渐增大,超连续谱展宽范围减小,其平坦度也逐渐劣化;具有适当的正负啁啾脉冲,在高非线性光子晶体光纤传输中获得宽而平坦超连续谱.

**关键词:** 非线性光学 高非线性光子晶体光纤 数值模拟 超连续谱 线性啁啾

### Supercontinuum generation in highly nonlinear photonic crystal fiber

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#### Abstract:

The nonlinear generalized Schrödinger equation has been applied to describe supercontinuum generation, whose evolution is simulated by numerical methods in the normal-dispersion regime of high nonlinear photonic crystal fibers (HN-PCFs). The effect of the pulse parameters such as the peak power of pump pulse, pulse width and the frequency chirp on the characteristics of the supercontinuum spectrum has been researched and analyzed. The numerical simulations show that with the increase of the peak power, the spectral width becomes wider and the flatness of supercontinuum becomes better. With the increase of the pulse width gradually, the spectral width becomes narrower and the flatness of supercontinuum becomes worse. It is investigated that a broadband and flat supercontinuum was generated when the proper positive and negative chirp pulse transmitting along high nonlinear photonic crystal fiber.

**Keywords:** nonlinear optics high nonlinear photonic crystal fiber numerical simulation supercontinuum spectrum linear chirp

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