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激光与光电子技术应用

时域傅里叶变换的受激布里渊散射线宽测量

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摘要:

为了实时精确地测量受激布里渊散射线宽,采用了一种利用脉宽时域傅里叶变换的方法,实验研究了在5℃~40℃的温度变化范围内受激布里渊散射脉宽和线宽之间的相互关系。首先测量了不同温度下的受激布里渊散射脉宽,然后经过傅里叶变换以及线宽校准,得到不同温度下的受激布里渊散射线宽。结果表明,脉宽时域傅里叶变换测量受激布里渊散射线宽的方法具有较高的测量精度,最大测量误差小于3.5%,是一种简便可行的方法。

关键词: 非线性光学 受激布里渊散射 傅里叶变换 脉宽 线宽

Measurement of SBS linewidth based on time-domain Fourier transform

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Abstract:

A novel method was put forward to measure the line width of stimulated Brillouin scattering(SBS) in water based on time-domain Fourier transform. The pulse duration and line width of SBS was studied over a temperature range of 5℃ to 40℃. Firstly, the pulse duration is measured with an oscilloscope, then the pulse duration at different temperature was obtained through Fourier transform and linewidth alignment. Experimental results and estimation of statistical error show that, this method possesses higher measurement accuracy(maximum error of measurement is less than 3.5%) and is a simple and feasible approach.

Keywords: nonlinear optics stimulated Brillouin scattering Fourier transform pulse duration linewidth

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