

光纤技术

## 一种基于外差探测的光纤Bragg光栅温度传感器

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收稿日期 修回日期 网络版发布日期 2006-7-21 接受日期

**摘要** 提出了一种基于光纤Bragg光栅的温度传感器, 阐述了光纤Bragg光栅的温度传感机理, 用2个相同的光纤Bragg光栅构成折叠式Mach-Zehnder (M-Z)干涉仪, 其中一个光栅作为参考臂, 另一个作为传感臂; 采用外差探测技术来测量外界的温度物理量。当温度发生变化, Bragg光栅的波长也随之改变。外差探测用来探测传感臂和参考臂由于温度变化引起的输出信号的频率差异。对其动态测量范围和灵敏度也进行了分析。

**关键词** [光纤光栅](#) [外差探测](#) [动态范围](#) [灵敏度](#)

分类号

## A fiber Bragg grating temperature sensor based on heterodyne detection

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**Abstract** In this paper, a fiber Bragg grating (FBG) based temperature sensor is presented and its temperature measurement mechanism is explained. A folded Mach-Zehnder interferometer composed of two identical FBGs is employed in the sensing system. One of the gratings is used as a reference arm (local oscillator) and another as a sensing arm. The technology of heterodyne detection is utilized to measure the physical quantity of ambient temperature, since the wavelength of the FBG varies with the temperature. The heterodyne detection is used to detect the output signal frequency difference between the reference arm and sensing arm, which is caused by the temperature variation. The dynamic range and sensitivity of the system are analyzed and presented.

**Key words** [fiber Bragg grating](#) [heterodyne detection](#) [dynamic range](#) [sensitivity](#)

DOI:

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