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论文

基于低双折射光子晶体光纤Sagnac干涉仪的超低温度系数扭曲传感器

祖鹏[1,2],向望华[1,2],金永兴[3]

（1 天津大学 精密仪器与光电子工程学院,天津 300072）（2 光电信息技术科学教育部重点实验室,天津 300072）(3 School of Chemical and Biomedical Engineering,Nanyang Technological University,Singapore,637598）

摘要：

研究了低双折射光子晶体光纤中由光纤扭曲造成的圆双折射效应,并应用Sagnac干涉仪结构设计了扭曲传感器.在Sagnac环中的光子晶体光纤上施加机械压力引入初始线双折射并产生正弦干涉光谱,再扭曲光纤产生圆双折射使干涉光谱随扭曲角度移动.光谱峰值波长随扭曲角度变化符合Sinc函数关系,理论分析与实验相符.传感器灵敏度为1.00 nm/°,分比率为0.01°,并具有超低的温度系数-0.5 pm/℃.

关键词： 光子晶体光纤传感器 扭曲传感器 低双折射光纤 Sagnac干涉仪 双折射

Fabrication of Temperature-insensitive Twist Sensor Using Low Birefringent Photonic Crystal Fiber Based Sagnac Interferometer

ZU Peng[1,2],XIANG Wang-hua[1,2],JIN Yong-xing[3]

(1 College of Precision Instrument and Opto-electronics Engineering,Tianjin University,Tianjin 300072,China)
(2 Key Laboratory of Opto-Electronics Information and Technical Science(Ministry of Education), Tianjin 300072,China)
(3 School of Chemical and Biomedical Engineering,Nanyang Technological University,Singapore,637598)

Abstract:

The circular birefringence effect in the low birefringent photonic crystal fiber caused by fiber twist is investigated,which is applied in the Sagnac interferometer structure to realize a twist sensor.The mechanical force is applied on the photonic crystal fiber in the Sagnac loop to introduce initial linear birefringence and to generate a sinusoidal interference spectrum.Then,the dip wavelength of the spectrum shifts due to extra circular birefringence caused by the fiber twist.The relationship between the dip wavelength and twist angle follows Sinc function,which is in coincidence with the therical analysis.The achieved sensitivity and resolution of the sensor are 1.00 nm/(°) and 0.01°,respectively.The sensor possesses ultralow temperature coefficients of －0.5 pm/℃.

Keywords: Photonic crystal fiber sensor Twist sensor Low birefringence fiber Sagnac interferometer Birefringence

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通讯作者: 向望华(1947-),男,教授,主要研究方向为光纤技术与光通信、超快激光等.Email:whxiang@tju.edu.cn

作者简介:

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