

光纤技术

一种测量温度和流速的光纤光栅传感器

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摘要 提出一种基于铝片的测量温度和流速的光纤布喇格光栅(FBG)传感器。采用一种耐高温胶将光纤布喇格光栅封装在一小铝片上, 经过高温固化处理, 可保持光纤光栅传感器的稳定性。通过-20℃~100℃温度实验, 得到该传感器的温度灵敏度系数为0.0392nm/℃, 是封装前的3.5倍, 且传感器温度响应保持了很好的线性和重复性。从水温14.5℃时的流速实验中得到水流速在0~20m/s范围变化时, FBG峰值波长漂移了0.13nm,验证了此光纤光栅传感器测量流速的可行性。试验结果表明, 该传感器既可以作为温度传感器, 又可以作为流量传感器, 并且制作简单, 成本较低。

关键词 [光纤布喇格光栅](#) [传感器](#) [铝封装](#) [温度传感](#) [流速传感](#)

分类号

Fiber Bragg grating sensor for detecting temperature and flow velocity

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Abstract A novel aluminum plate based fiber Bragg grating (FBG) sensor is proposed to detect temperature and flow velocity. Fiber Bragg grating (FBG) was sealed on an aluminum plate by a high temperature resistant glue, then placed in a thermostat for solidification so as to retain the stability of FBG. The temperature and flow velocity sensing characteristics of the encapsulated FBG sensor were theoretically and experimentally studied. Encapsulated FBG sensor was placed in a digital thermostat to detect its temperature characteristics. In the temperature range of -20℃~100℃, the experiment result indicates that the temperature sensing sensitivity coefficient of encapsulated FBG sensor is 0.0392nm/℃ and is 3.5 times as much as that of bare FBG. The temperature response curve of the encapsulated FBG sensor keeps very good linearity and repetition. In the flow velocity experiment, the reflection peak wavelength of the encapsulated FBG sensor moved 0.13nm when the flow velocity changed from 0 to 20m/s with constant water temperature at 14.5℃. So it is feasible to use the encapsulated FBG sensor to detect the flow velocity. The result proves that the aluminum plate encapsulated FBG sensor can detect temperature and flow velocity. The encapsulated FBG sensor is easy to make, cost effective and practical.

Key words [fiber Bragg grating sensor](#) [aluminum encapsulation](#) [temperature sensing](#) [flow velocity sensing](#)

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