

光纤光栅应变传感器温度补偿计算值的改进

作者：侯立群, 赵雪峰, 冷志鹏, 孙涛

单位：东北电力大学

基金项目：国家自然科学基金面上项目，国家十二五科技支撑计项目

摘要：

温度补偿传统算法没有考虑光纤光栅应变传感器标定状态和实际测试状态的差别，在算法理论上存在不足。为解决这一问题，分析了测试状态下传感器的约束变形特征及温度影响，提出了温度补偿改进算法。通过对改进算法和传统算法的比较分析及混凝土试块应变测试试验，验证了算法的正确性。理论分析表明，改进算法体现了传感器本身的线膨胀系数和被测结构线膨胀系数的差别所带来的影响，理论上更合理。混凝土试块应变测试试验结果表明，利用改进算法得到的实测应变误差小于4，而利用传统算法得到的实测应变大于8。改进算法理论正确，计算结果精度更高，具有工程实用性。

关键词：光纤光栅；温度补偿；应变测试；线膨胀系数

Improvement of Temperature Compensation Calculated Value for FBG Strain Sensor

Author's Name:

Institution:

Abstract:

The conventional temperature compensation algorithms do not consider the difference between sensor calibration condition and actual test condition, therefore it is deficient in the theoretical aspect. In order to solve the above problem, the restrained deformation characteristics and temperature influence of the sensors under test condition were analyzed, and then an improved algorithm for temperature compensation was proposed. The correctness of the algorithm was verified by means of theoretical analysis and strain test on a concrete block. Theoretical analysis shows that the proposed algorithm has considered the influence from the difference of the linear expansion coefficient between the sensor and measured structure. Therefore, the improved algorithm is theoretically more reasonable. Test result shows that the strain calculation error from the improved algorithm is less than 4, however the error from the conventional algorithm is more than 8. The improved algorithm is correct in the theoretical aspect with higher accuracy, and can be applied in practical projects.

Keywords: fiber Bragg grating(FBG), temperature compensation, strain test, linear expansion coefficient

投稿时间：2013-03-10

[查看pdf文件](#)