

新型水泥基压电传感器的基本性能研究

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基金项目：国家自然科学基金

摘要：

本文开发一种可用于土木工程监测的水泥基压电传感器。该传感器是采用特制的封装材料将压电陶瓷片粘结在两个水泥立方体间而制成的。通过频率扫描及幅值扫描两种加载制度对传感器的频率独立性、线性度等基本性能进行测试，并通过复杂荷载、随机荷载及方波荷载对该传感器的性能进行进一步验证。试验结果表明本文提出的水泥基压电传感器在土木工程结构的自振频率范围内具有很好的频率独立性，同时在传感器输出幅值和输入荷载幅值间存在高度的线性关系，能够准确反映各种复杂荷载。由此可知，本文开发的水泥基压电传感器适用于土木工程结构的性能监测。

关键词：压电传感器，水泥基，试验，频率独立性，线性度

Performance of a novel cement-based piezoelectric sensor

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Abstract:

A novel cement-based piezoelectric sensor was developed in this paper. The sensor was made by bonding between two cuboids of hardened cement paste with a commercially available piezoelectric ceramic plate which is sensing element using a new adhesive developed during the fabrication of sensor. The frequency response and linearity of the sensor were tested by frequency sweep and amplitude sweep load schemes. And then the complex load, random load and square load were applied to observe the performance of the sensors. From the test results it has been found that the sensor showed a good frequency independency in the common frequency range of a civil engineering structure and the output of sensor was linearly corresponding to the input of sensor, which was illuminated further in the following experiments including complex load, square load and random load. So, there is a good potential for such a sensor to be used in structural performance monitoring.

Keywords: piezoelectric sensor, cement-based, test, frequency independency, linearity

投稿时间：2011-10-01

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