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半电极含金属芯压电纤维的动态微力传感器

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摘　要：

半电极含金属芯压电纤维（HMPF）是一种新型压电传感器。建立了HMPF的动态微力传感理论模型。根据第一类压电方程，基于振动理论，用平均电荷方法，推导出悬臂梁结构HMPF自由端受到垂直动态微力作用后，产生电荷的解析表达式；分析了HMPF长度和半径比对产生电荷的影响。实验结果表明，HMPF可以测量动态微力的频率和幅值，具有较高的动态微力传感灵敏度。

关键词：半电极、金属芯、压电纤维、传感器、动态微力

Micro dynamic force sensor using half coated metal core piezoelectric fiber

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Abstract:

The half coated metal core piezoelectric fiber (HMPF) is one of the new type piezoelectric devices for sensors. The mechanical model were derived when an HMPF worked as a dynamic micro force sensor. When an external harmonically varying micro lateral force is applied at its tip of a cantilevered HMPF, the electric charge of the sensor were calculated based on the piezoelectric constitutive equations, the vibration theory and the average distributed electrical charge method. The effects of the radius and Young's modulus of the metal core on the behaviors of HMPF sensor were studied theoretically. And the sensing properties of the sensor were studied experimentally. The experimental results show that the frequency and amplitude of a dynamic micro force can be obtained, and the sensor can give a high sensitivity.

Keywords: Half coated, metal core, piezoelectric fiber, sensor, dynamic micro force

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