传感技术学报
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带谐振腔的微型压电风能采集器

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摘　要：

为了提高基于风致振动机理的微型风能采集器在低速风作用下的输出功率，提出一种带谐振腔的微型压电风能采集器结构，该采集器由谐振腔和振动梁构成，振动梁由压电梁和柔性梁组成。谐振腔可以改变振动梁附近的流场分布，扩大作用于振动梁的动风载荷，从而提高了采集器在低速风作用下的输出功率。实验分析了风速、压电梁长度和柔性梁长度对采集器输出性能的影响。当谐振腔尺寸为64mm×22mm× 14mm，振动梁长度和宽度分别为38mm和6.4mm时，微型风能采集器在17m/s风载荷作用下的最大输出功率达到1.28mW。

关键词：压电；风致振动；谐振腔；风能采集

Micro Piezoelectric Wind Energy Harvester with a Resonant Cavity

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Abstract:

A micro wind-induced-vibration-based piezoelectric energy harvester with a resonant cavity was proposed to increase the output power under low velocity wind loading. A piezoelectric wind energy harvester is composed of a resonant cavity and a vibration beam which consists of a piezoelectric composite beam and a flexible beam. The resonant cavity changes the flow field distribution in the vicinity of the vibration beam, which enlarges the dynamic wind loading on the beam and increases the output power under low velocity wind loading. The influence of the wind velocity, the length of the piezoelectric composite beam and the length of the flexible beam on the output properties of the harvesters was experimentally analyzed. For a wind energy harvester with the resonant cavity of 64mm×22mm×14mm and the vibration beam of 38mm×6.4mm ×0.38mm, the maximum output power is 1.28mW under the wind loading of 17m/s.

Keywords: piezoelectricity; wind-induced-vibration; resonant cavity; wind energy harvestering

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