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Energy Harvesting, Wireless, Non-Contacting Slip Ring for Rotorcraft

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This work demonstrated a magneto-inductive energy harvester for use as the energy source for a wireless, non-contacting "slip ring" capable of communicating digital data while providing real-time structural health monitoring (SHM) system for helicopter rotor components.

The energy harvester used the relative spinning motion of the rotor head swash plate to rotate small coils past permanent magnets, which generated an alternating (AC) current within the coils. A rectifier and DC-DC converter provided a constant 3.6 VDC output in the face of widely varying input AC voltages and spinning magnet frequencies in order to facilitate start-up from a rotor stopped condition. The system included protection from high voltage transients such as those from static discharge or lightning.

The spin energy harvester (0.5 kg), with one 13cc magnet, four 34cc coils, and with a 5mm gap, produced ~9Watts DC output at relative velocities of 9m/s. The harvester can be mounted to a swash plate to continuously power a scalable network of wireless sensor nodes in the rotating frame.

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Ключевые слова:

Содержание

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