

Supplementary Information (SI)

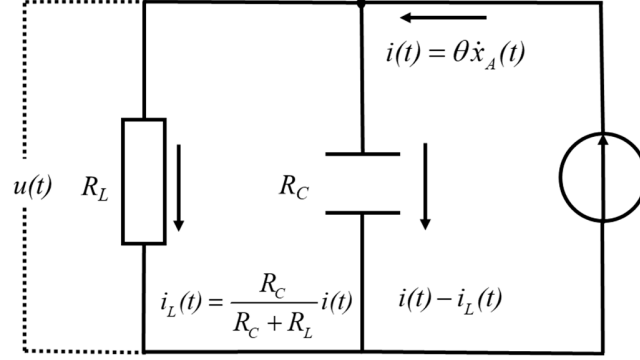


Figure S1. The equivalent RC parallel circuit of the harvester.

In Figure S1, $i(t)$ is the total instantaneous current generated by the harvester; $i_L(t)$ represents the instantaneous output current; R_L and R_C are the external resistance and capacitive reactance, respectively. The instantaneous output voltage $u(t)$ and power $p(t)$ are:

$$u(t) = \left(\frac{R_C}{R_C + R_L} i(t) \right) R_L = \frac{R_C}{\frac{R_C}{R_L} + 1} \theta \dot{x}_A(t) \quad (1)$$

$$p(t) = \left(\frac{R_C}{R_C + R_L} i(t) \right)^2 R_L = \frac{R_C^2}{\frac{R_C^2}{R_L} + 2R_C + R_L} \theta^2 \dot{x}_A(t)^2 \quad (2)$$

where θ represents the electromechanical coupling coefficient, and $x_A(t)$ is the vertical displacement of the tip magnet at the free end of the piezoelectric beam. The capacitive reactance is given by:

$$R_C = \frac{1}{2\pi f C_p} \quad (3)$$

where f and C_p represent the frequency of the excitation and the equivalent capacitance of the piezoelectric patch, respectively.