Power and efficiency of Feynman ratchet

We focus on an overdamped two-dimensional diffusion of a particle in a corrugated tilted periodic potential. The particle is subjected to two white noise sources with different intensities representing two heat baths at different temperatures. The model dynamics mimics a working principle of the famous Feynman ratchet and pawl. Using a perturbation expansion in potential width, which is similar in spirit to Fick-Jacobs theory, we obtain stationary probability current, mean velocity of the particle and also discuss energetics of the ratchets including its output power and efficiency.

[1] V. Holubec, A. Ryabov, M. H. Yaghoubi, M. Varga, A. Khodaee, M. E. Foulaadvand and P. Chvosta, Thermal ratchet effect in confining geometries, Entropy 19, 119, 2017

[2] A. Ryabov, V. Holubec, M. H. Yaghoubi, M. Varga, M. E. Foulaadvand and P. Chvosta, Transport coefficients for a confined Brownian ratchet operating between two heat reservoirs, J. Stat. Mech. 2016, 093202, 2016

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