化学物理・生物物理セミナー

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A classical engine with ideal efficiency and nonzero power: is it possible?

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要旨：

A classical engine with ideal efficiency (i.e., efficiency unity for a chemical engine and Carnot efficiency for a thermal one) has zero power because a reversible cycle takes an infinitely long time. However, at least from a theoretical point of view, it is possible to conceive (irreversible) engines with nonzero power that can reach ideal efficiency. One way to attempt this is by replacing the usual linear transport law by a sublinear one and taking the step-function limit for the particle current (chemical engine) or heat current (thermal engine) versus the applied force [1]. We speculate on the physical motivation for a sublinear law and a step-function law in the context of criticality and first-order phase transitions, respectively. Quantum engines are also relevant in this context but will not be discussed in this talk.

[1]. J. Koning and J.O. Indekeu, “Engines with ideal efficiency and nonzero power for sublinear transport laws”, Eur Phys. J. B 89, 248 (2016).

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