

[P15] Linear irreversible thermodynamics for a thermal engine with information communication process

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Since the publication of “A Mathematical Theory of Communication” by C. Shannon in 1948, scientific methods to analyze information communication has been developing and there has been much interests in integration of physics and information theory. Recently a novel model of a thermal engine which has information communication process in the working cycle has been conceived [1] and the maximum efficiency and the efficiency at the maximum power has been shown to attain the Carnot efficiency and the Curzon-Ahlborn efficiency (linear response regime), respectively. This model could also be understood as a work extraction process by the Maxwell demon whose information processing in its brain is explicitly taking into account. By identifying the Onsager coefficients of this engine [2], we would like to explain the appearance of the Curzon-Ahlborn efficiency from a viewpoint of linear irreversible thermodynamics [3], which suggests physical consistency between the physics of the thermal engine, linear irreversible thermodynamics and the Shannon’s information theory. If possible, we would like to apply our analysis to the Szilard engine as an example.

References

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- [3] C. Van den Broeck, Phys. Rev. Lett. **95**, 190602 (2005).