

Comparative Performance Analysis of a Brownian Carnot Cycle from the Perspective of a Stochastic Model against the Linear Irreversible Thermodynamics Theory [†]

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In this work we present a Brownian Carnot Cycle, which has already been studied by Schmiel et al. (2007) as well as Izumida and Okuda (2010); but now considering two different working regimes, namely the Maximum Ecological Function (MEF) and the Maximum Efficient Power (MEP). For the MEF and MEP working regimes, the thermodynamic properties of the cycle are obtained, in particular, it showed that the maximum efficiency now depends on two parameters α and β , instead of only one parameter obtained previously by Schmiel et al. In maximum power regime. It is worthwhile to notice that for characteristic values of α and β the original results obtained by Schmiel are recovered.

From the previous observations, the authors consider that the results obtained represent a more general case that includes other working regimes. It is important remark that one of the most astonishing results obtained, is that those thermal engine models show some universality regarding the behavior of the efficiency when it works at the maximum power regime, although the analyzed models were different in nature and scale.

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Reference

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