Review of: "Classical Thermodynamics: Primacy of Dissymmetry Over Free Energy"

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Potential competing interests: No potential competing interests to declare.

Thank you very much for the opportunity to read and review Professor Lin_Shu Wang's article “Classical Thermodynamics: Primacy of Dissymetry Over Free Energy.”

After carefully reading the article, I rate it very highly (on a scale of rating 4/5) and I strongly recommend it for publication.

There is thermodynamic investigation of the cyclic energy conversion processes in isolated systems (in the heat engines), as well as a historical survey of the evolution of thermodynamic points of view and its notions or concepts in the author’s paper.

A main thesis of the paper is that (as I understand it, and in my words) in the analysis of non-reversible processes (near equilibrium), like the heat-to-mechanical energy conversion (e.g., in the heat engines), the concept of free energy (Helmholtz and Gibbs’ potentials) should not dominate, but asymmetry should prevail. Instead, in such a description, the fact of dissymmetry between the processes towards equilibrium and the processes that move the system away from equilibrium should have primacy. This idea is very useful and valuable in the field of thermodynamics and the analysis of such processes.

There are several things worth noting here, and I have some modest comments on the issues raised in this article:

(i) In case our system is a non-autonomous system, we cannot talk about a continuous dynamical system (flow) induced by solutions of its mathematical model, e.g., the initial value problem.

(ii) A more general description of the problem can be provided by the statistical physics of non-equilibrium processes and dealing with the issue of the heat-to-mechanical energy conversion process as a kinetic problem -- it is possibly a special case of a problem of energy transport via energy carriers (e.g., electrons) electron. There are the Boltzmann equation method as well as the kinetic integrals method (these integrals are very similar to Fermi integrals). Finally, we have these thermodynamic as well as kinetic parameters.

Best regards,

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