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

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Potential competing interests: No potential competing interests to declare.

Summary of the Work

First of all, the author introduced the concept of the "*primacy of energy*", in which free energy dissipates spontaneously and universally. Secondly, he distinguished two approaches:

1) *Gibbsian thermodynamics*, which is based on the entropy law (the *dissymmetry proposition*);

2) *Engineering thermodynamics*, which is based on the premise of the primacy of energy.

The central suggestion of the author is that engineering thermodynamics should be erected on the premise of the primacy of dissymmetry over free energy.

Main Results Obtained

With the above suggestion, the two branches of thermodynamics are unified to become *classical thermodynamics*, allowing for the understanding of reversibility, which the author calls "*the Carnot·Clausius·Gibbs account of a new Thomson problem*".

General Considerations

- This work is "*halfway*" between a review manuscript and a research article. Furthermore, at times, the author goes on to explain very well-known concepts.

- The manuscript is excessively long, and some sections could be rewritten in a much more concise manner without losing clarity.

- At first reading, the abstract appears to be rather obscure. It introduces concepts such as "the dissymmetry proposition" or "the primacy of energy," which are clear only after reading the entire manuscript.

- Section 2. is very well written; I enjoyed reading it.

- Some aspects need to be clarified. The following suggestions aim to fill some gaps in the work.

Suggestions

1) In my opinion, the abstract is not written in a sufficiently attractive way. It is recommended to rewrite it in such a way as not to force interested people to read the entire manuscript to understand the meaning of the terms introduced.

2) It is recommended that the author summarizes at least the parts that are very well-known.

3) First of all, the author should clearly explain why it is so important to treat the so-called issue: "*Carnot/Clausius account of Thomson's problem*". This explanation should already be included in the abstract.

4) In my opinion, the most vulnerable aspect of this work is that the author does not take into account in his discussion of Ilya Prigogine's work regarding the entropic balance equation: $dS=d_eS+d_iS$ with dS, d_eS, and d_iS indicating the variation of the total entropy, the reversible entropy, and the dissipative contribution. The author is advised to address this topic and integrate it into his discussion (particularly in section 2 of the manuscript).

Conclusions

I advise the author to take into account the suggestions expressed above. In my opinion, this will help to attract the reader's interest more. In particular, it is recommended to fill (some) identified gaps in the manuscript.