Review of: "Tailoring the First Law of Thermodynamics for Convective Flows"

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Potential competing interests: No potential competing interests to declare.

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While this paper presents an intriguing concept, the execution of its presentation is found to be wanting. A thorough review of the introduction and other sections reveals many issues. In light of these observations, it is recommended that the paper undergo a significant revision before it can be considered for publication. The author is encouraged to consider the following comments while making the necessary improvements to the manuscript.

General comments:

- The keywords are better not included in the title.
- Abstract is insignificant, since completely known to the readers. An Abstract MUST summarize the method, objectives, novelty, and major findings of the work. No such aspects are dealt with.
- The Introduction is unsuccessfully written. It should guide the readers on why and how the paper will add novelty to the current knowledge.
- Where were AI used in this work? Please refer to them in the report (not in the manuscript).
- At the end of the introduction, provide a paragraph showing the gap, novelty, aim, objective, and the importance of this work.
- The captions of the figures and tables should be written in detail.
- The model description is not clear; describe more.
- The results and discussion section should be explained and justified deeply.
- There are a huge number of grammatical errors; the paper should be revised by an expert.
- Reconsider the format of the whole paper.
- The paper needs nomenclature.
- For each statement in the results and discussion section, you need to answer why this happened in detail.
- Explain what this geometry means? What is its application, and why it is important to be studied.
- The conclusion is not clear and not presented very well; present some main outcomes.
- At the end of the conclusion, state what all this means and what the proposed future work is.
- What are the main factors affecting this system?
- The results and the data should be expanded and discussed in more detail, and justify all the statements physically.

Specific comments:

1. The mechanism behind the hysteresis phenomenon in turbulent convection refers to the process by which the system exhibits a lag or delay in response to changes in the driving forces or conditions.

2. The preferred wavenumbers for two-dimensional disturbances in the Rayleigh-Bénard issue are determined by analysing the behaviour of the system.

3. What methods may be used to ascertain the final condition of Rayleigh-Bénard turbulence?

4. All equations need references.

5. How can we apply the principles of nonequilibrium thermodynamics to explain the behaviour of nonlinear Langevin systems that are influenced by non-conservative forces?

6. How can we utilise global thermodynamics principles to enhance energy efficiency in heat conduction systems?

7. What are the practical uses of nonequilibrium calorimetry in real-world scenarios, and how can it be employed to enhance industrial processes?

8. To get a more profound comprehension of these subjects, it is crucial to possess a solid groundwork in thermodynamics and statistical mechanics.

9. To ensure the accuracy and relevance of research in these domains, it is important to remain current with the most recent advancements in the field through the perusal of scientific literature and participation in conferences.