

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

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Potential competing interests: No potential competing interests to declare.

The article develops a thermodynamic framework to describe non-uniform macroscopic systems, i.e., systems not in equilibrium. This work is certainly novel, carries significant merit, and suggests intriguing implications. For instance, the optimistic goal of assigning thermodynamic states to turbulent flows and predicting how these states transition within a thermodynamic framework is particularly compelling. The article is well-written, with a smooth overall flow. The mathematical development is clear and concise. The author effectively highlights the potential future applications of the work. My minor suggestions are as follows:

1. It should be clarified in the text that the pressure tensor includes both normal and shear components.
2. It would be helpful to mention that Eq. 23 represents a form of exterior differentiation, and the final term can be seen as a 'pseudo-flux,' as it corresponds to the flux at the changing boundary (outside the volume).