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

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I am rather split reading re-formulations, etc., of classical thermodynamics – on one hand, they seem to be never-ending (and thus useless), on the other hand, they demonstrate that there is still not full understanding. In my opinion, classical thermodynamics, in its making, was put on modern grounds in the book by Truesdell and Bharatha, The Concepts and Logic of Classical Thermodynamics as a Theory of Heat Engines, 1977. However, this is probably too mathematical, and thus other attempts appear. So much for the introduction; now to some selected points.

The concepts of reversibility, internal reversibility, and quasi-staticity are referenced but not stated, defined, explained. Anyway, I think that they are superfluous because various non-equilibrium thermodynamic theories give equilibrium processes as a (clear) special case.

Around eq. (9) – why is this relation fundamental? Just Truesdell and Bharatha stress the care which should be taken in selecting independent variables and proving the existence of functions in thermodynamics. Similarly, for the statement below eq. (19): “The first law introduces the variable U, with the introduction one can express U as a function of the set of any two of the variables p, V, and T, e.g.,...” Several lines further, regarding U(T,V) – why is “complete knowledge” lost? Truesdell and Bharatha, again, justifies why temperature and volume are fundamental variables in classical thermodynamics.

Part 3 is full of traditional derivations (manipulations with functions), but I do not understand the (principle of?) dissymmetry announced in its title. The dissymmetry should be clearly explained, defined, etc., and its benefit (role?) stated – sec. 7 did not help me.

I do not think that heat is an energy, even disorganized. It is just one way of energy transfer between bodies, like work.

I was rather lost in the mixture of derivations, historical notes, (practical) examples – the text should be reorganized somehow. Perhaps the history could be shortened and collected into a separate section. Dissymmetry seems to be the main point; it should be clearly defined and justified in another separate section. Finally, illustrations of advantages to use the dissymmetry could be provided and contrasted with the free energy approach. Personally, and if understood correctly, I would not state the first law against the second one, entropy against energy, but take them together as two sides of one common coin.