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Book Review: *A Commentary on Thermodynamics*

A Commentary on Thermodynamics. William A. Day, Springer-Verlag, New York, 1988.

In this brief monograph, the author derives a nonlinear theory of thermoelasticity from purely phenomenological considerations. Approximations to this theory lead to homogeneous and dissipationless thermoelasticity and linearized thermoelasticity. The aim of the author is to utilize the mathematical formalism of these field theories to gain insight into some of the fundamental properties of thermodynamics: in particular, the concepts of quasistatic, reversible, and irreversible processes.

The main results obtained are limits on the efficiencies of cyclic processes and confirmation of the various physical statements of the second law of thermodynamics. These consequences follow from assumptions concerning the positive signs of certain dissipative coefficients, e.g., the thermal conductivity coefficient, and use of the assumption that the functional relations of thermodynamic quantities are the same as in equilibrium. These consequences are well known in hydrodynamic theories.

It is not clear that the approach presented here sheds any more light on the nature of quasistatic, reversible, and irreversible processes than is obtained from straightforward thermodynamic considerations. The claim that the nonlinear theory is exact is valid only from the phenomenological point of view.

Despite these caveats, I found the volume interesting.

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