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Unification of Mechanics and Thermodynamics

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Opinion

As an available and very important challenge, the integration of mechanics and thermodynamics in order to be used for special applications is proposed [1-3]. The purpose of integrating thermodynamics and mechanics is to present integrated equations in such a way that they simultaneously cover the laws of thermodynamics and the laws of motion [2,4]. Various ideas can be proposed for this purpose [4-5]. It is necessary to note that the common point of all scientific theories is the "***Energy Conservation Principle***" which is agreed upon. What is the root of the difference is that the parameters used in each theory to explain the phenomena are different. Also, on the other hand, each theory is usually written for a specific category of physical phenomena, and its principles and laws deal with a specific aspect of nature's behavior. It seems that by formulating a suitable equation based on the energy components of the system, it is possible to directly apply concepts such as irreversibility, mutual conversion of mass and energy, etc. The law extracted.

Today, the concept of entropy is broader than the one defined by Clausius. The entropy defined by Clausius is called thermodynamic entropy, while some researchers have also defined entropies in addition to thermodynamic entropy, which are used in relevant scientific fields to investigate problems. These definitions, generally, are based on the energies that participate in the relevant issues and are important, and the corresponding entropy changes depend on these energies. Processes in which there is entropy production are called irreversible processes. The cases that can cause the irreversibility of a process can be observed microscopically in the theories that are stated to prove the second law of thermodynamics. In the macroscopic point of view, the existence of friction, heating the system at a limited rate, the existence of temperature gradient, etc. are considered as factors that cause the irreversibility of a process and also the production of entropy. The existence of different expressions for the second law of thermodynamics can be a bit confusing, although it leads to a more comprehensive understanding of this very important law. Therefore, a comprehensive and general statement that can result in other statements can be very important. The energy structure theory examines this case by providing a general expression for the second law of thermodynamics. It is necessary to base the general expression of the second law on the energy components of the system.

By considering the energy components of the system as quantities that can describe the performed process, a new space for the governing equations is created in which the effects of the second law of thermodynamics can be directly introduced in the energy structure of the system, as well as the sensitivity of the system to the second law can be studied. In the resulting space, the compatibility equations of the system can be expressed in the relevant process, and in fact, the created space is a complete space for the purpose of expressing the governing equations. The resulting space can be called "ENERGY SPACE". The energy space of the system is, in fact, "a space of energy components that can be activated in a specific process by changing the conditions of applying energy". Therefore, for each physical process that the system experiences, one of its energy subspaces will be sufficient to cover the set of governing equations.

References

1. Dostalík Mark, Vít Průša (2022) Non-Linear Stability and Non-Equilibrium Thermodynamics-There and Back Again. Journal of Non-Equilibrium Thermodynamics 47(2): 205-215.
2. Shahsavari Saeed, Mehran Moradi (2021) A General Solution to the Different Formulations of the Second Law of Thermodynamics. Journal of Advanced Research in Fluid Mechanics and Thermal Sciences 82(2): 61-71.
3. Rojas, Eduardo (2022) Towards a Unified Soil Mechanics Theory: The Use of Effective Stresses in Unsaturated Soils. Bentham Science Publishers.
4. Shahsavari Saeed (2021) Possibility unique combination for first and second law of thermodynamics. Quantum Journal of Engineering, Science and Technology 2(5): 51-52.
5. Alotta, Gioacchino, Mario Di Paola, Francesco Paolo Pinnola (2022) A unified formulation of strong non-local elasticity with fractional order calculus. Meccanica 57(4): 793-805.

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