TUHH

TECHNISCHE THERMODYNAMIK

DO WE REALLY NEED “ENTRANSY”?

A CRITICAL ASSESSMENT OF A NEW QUANTITY IN HEAT TRANSFER ANALYSIS

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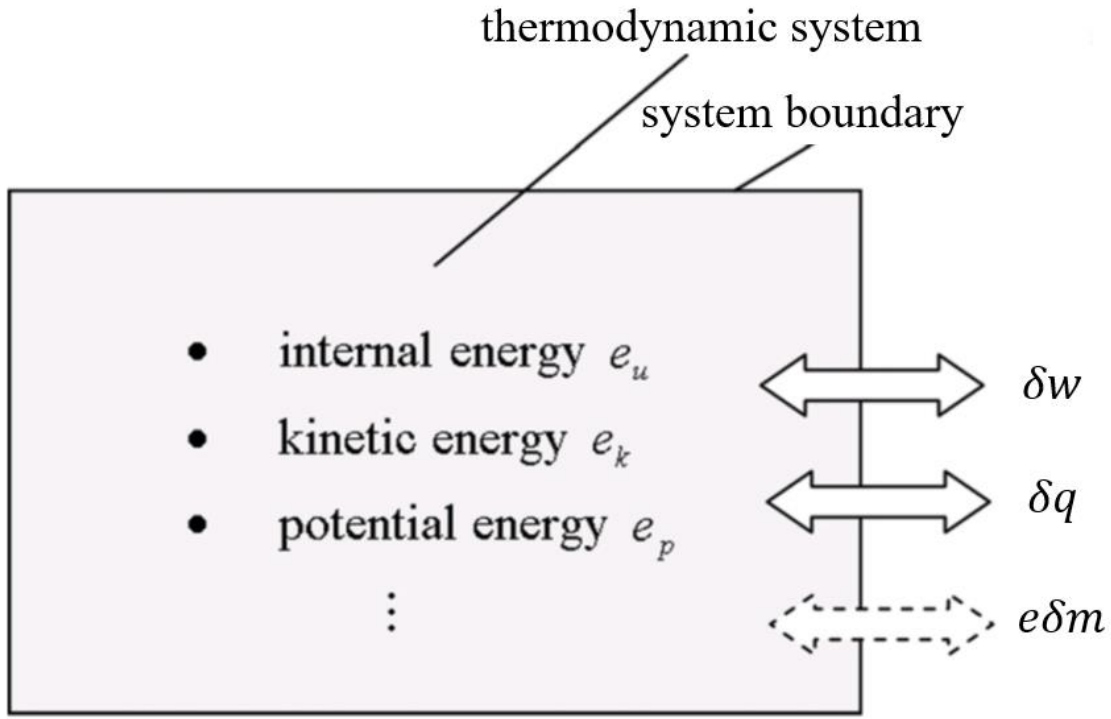
- energy , energy conversion
- entropy , entropy generation

The Classical Concept of Heat Transfer



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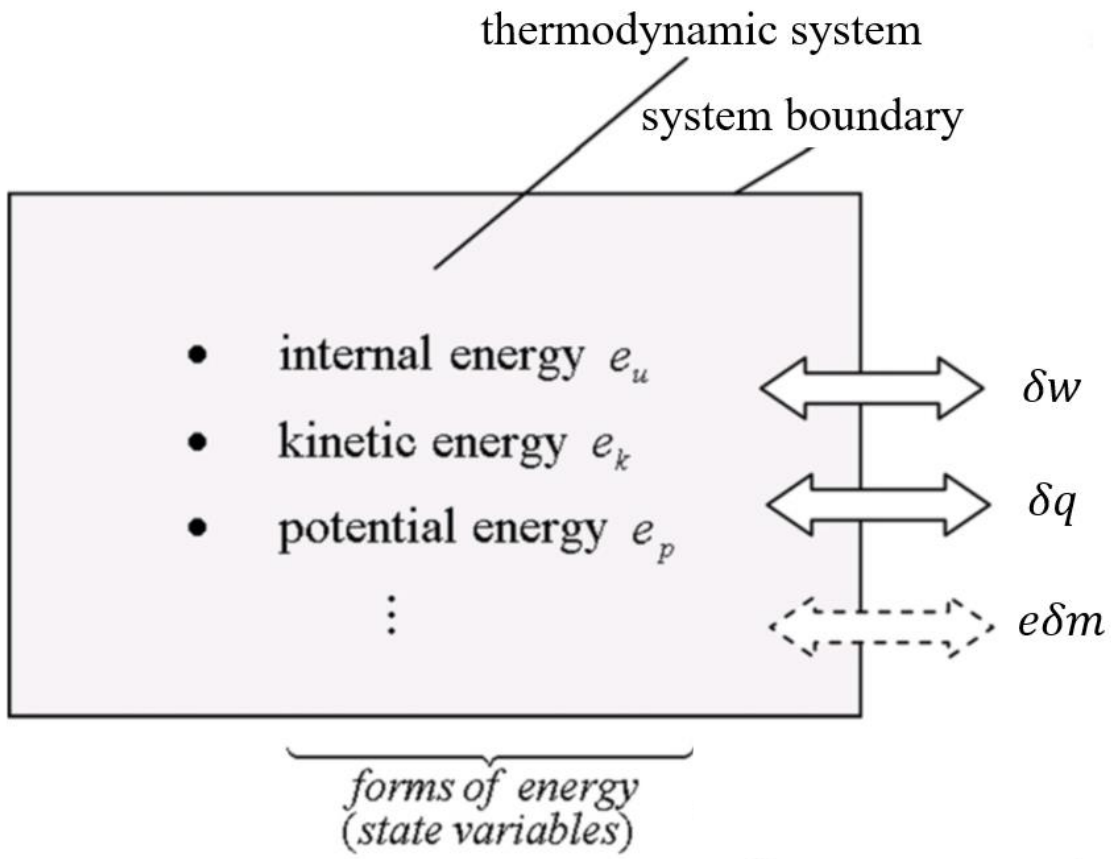

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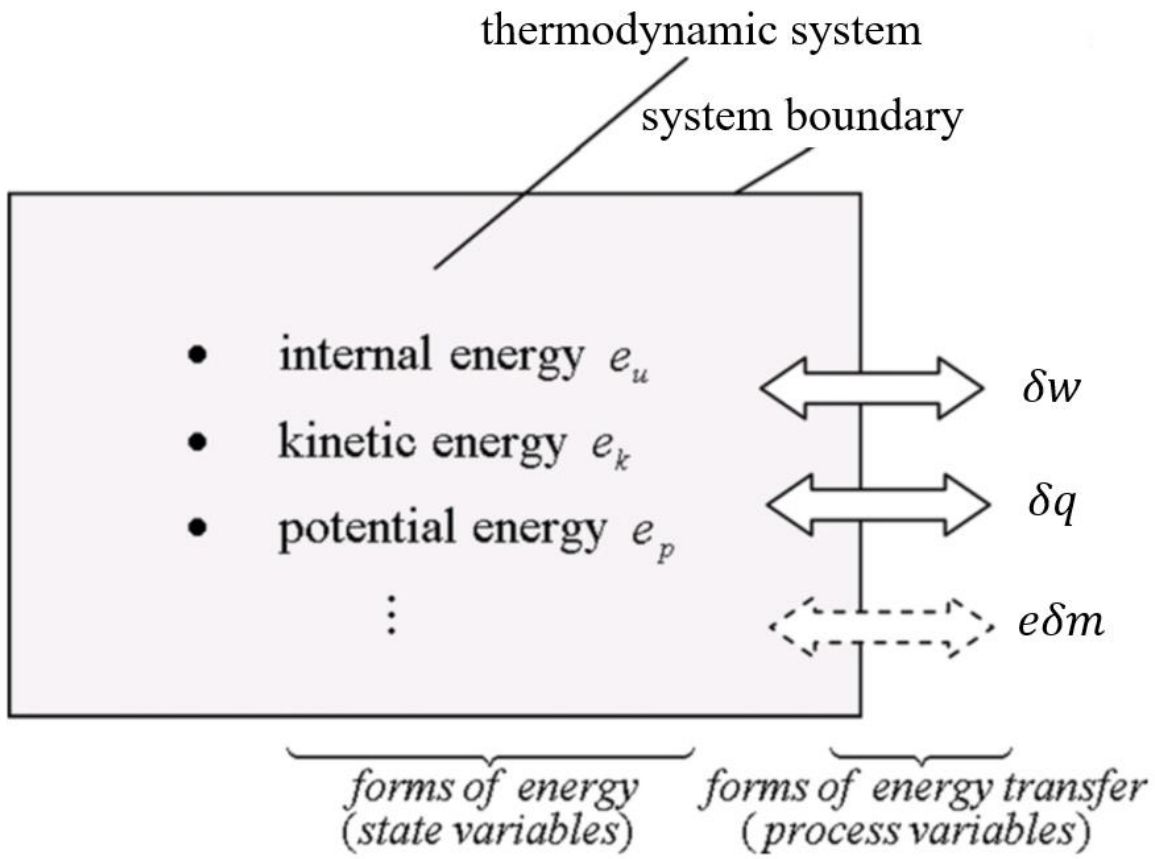

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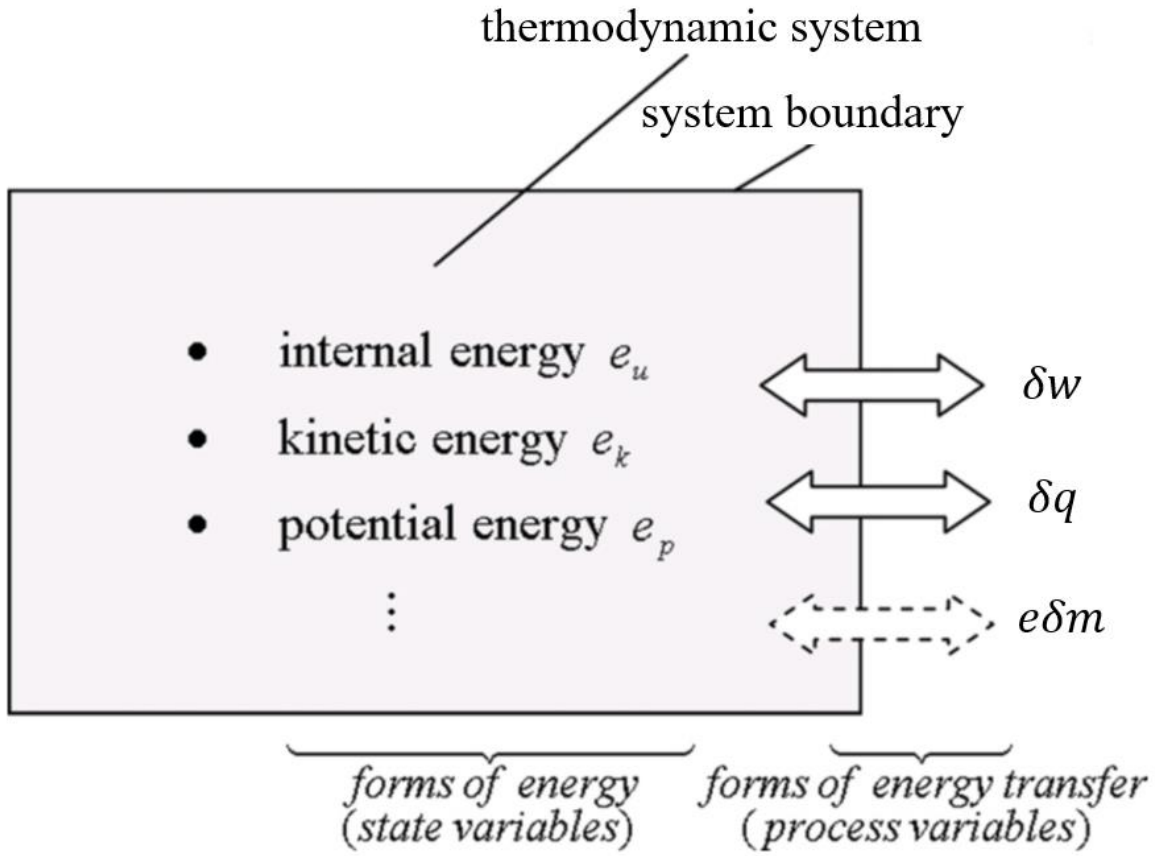

- **State quantity:** characteristic quantity that accounts for certain aspects of the state in which a system happens to be (*energy, pressure, temperature, entropy,…*).

- **Process quantity:** characteristic quantity that accounts for the way in which certain state quantities are changed (*energy transport across system boundaries, entropy generation, …*).

Extending the Classical Concept: The Entransy G

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- **Is there a real need for the extension of the classical theory by introducing entransy as a quantity that was missing in the past?**

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Entransy definition: $G \equiv \frac{1}{2} m e_u T = \frac{1}{2} m c_v T^2$

Dimension: Energy x Temperature (JK)
Meaning: „Potential energy“ of the thermal energy

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Problem 1: **By dimensions entransy is not an energy**

Problem 2: **Entransy can be stored, i.e. it is a state quantity**
Entransy corresponds to the heat transfer ability,
i.e. it is a process quantity

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Motivation: “However, an irreversible heat transfer process seems to have its own particularity, for the heat energy always remains constant during transfer and it doesn’t appear to be readily clear what is the non-conserved quantity in a heat transfer process.”

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Problem 3: There is a well established „non-conserved quantity in a heat transfer process" : EXERGY

Problem 4: The entransy dissipation extremum principle depends on the thermal boundary conditions – what it better should not !

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My Question:

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How good is a new physical quantity that has at least four problems ?