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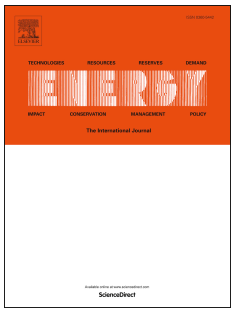

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# A decomposition method for the evaluation of component interactions in energy conversion systems for application to advanced exergy-based analyses

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**Abstract**

A new approach for the calculation of the interactions among the components of a thermal system for application to the concept of advanced exergetic analysis is presented. The approach can be used to determine the thermodynamic interactions of system components, and to evaluate alternative designs. The new approach puts the calculation of endogenous and exogenous exergy destruction on a proper thermodynamic basis and introduces a straightforward and time-saving calculation procedure in contrast to various approaches used in the past. When employed to the analysis of the CGAM-problem, the new approach complies with qualitative reasoning, resolves shortcomings and shows comparable results with previous approaches. The top-down hierarchical approach assists in achieving the best system design possible by identifying the effects of design decisions and by stimulating the engineer's creativity in terms of design alternatives and optimization options. Furthermore, the generalization of the approach allows for any level of aggregation, thus, making the determination of improvement potentials easier. By providing profound thermodynamic understanding for processes, the advanced exergetic analysis is a promising tool for designing, analyzing and optimizing processes for higher efficiencies and lower costs.

*Keywords:* Exergy Analysis, Advanced Exergy Analysis, Process Analysis, Thermodynamic Interactions in Energy Conversion Systems

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