

Entropy-Based Design and Analysis of Fluids Engineering Systems

Entropy and the Second Law are keys to maximizing performance in engineering systems. They serve a vital role in achieving the upper limits of efficiency in industrial processes and the quality of manufactured products. Entropy-based design (EBD) can shed new light on various flow processes, ranging from optimized flow configurations in an aircraft engine to highly ordered crystal structures in a turbine blade.

Entropy-Based Design and Analysis of Fluids Engineering Systems provides an overview of EBD as an emerging technology with applications to aerospace, microfluidics, heat transfer, and other disciplines. The text extends past analytical methods of Entropy Generation Minimization to numerical simulations involving more complex configurations and experimental measurement techniques.

The book begins with an extensive development of basic concepts, including the mathematical properties of entropy and exergy, as well as statistical and numerical formulations of the Second Law. It then goes on to describe topics related to incompressible flows and the Second Law in microfluidic systems. The authors develop computational and experimental methods for identifying problem regions within a system through the local rates of entropy production. With these techniques, designers can use EBD to focus on particular regions where design modifications can be made to improve system performance. Numerous case studies illustrate the concepts in each chapter, and cover an array of applications including supersonic flows, condensation, and turbulence.

A one-of-a-kind reference, **Entropy-Based Design and Analysis of Fluids Engineering Systems** outlines new advances showing how local irreversibilities can be detected in complex configurations so that engineering devices can be redesigned locally to improve overall performance.



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