

热能工程

火电机组热经济性分析的统一物理模型和数学模型

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摘要: 为实现火电机组节能降耗的目的,以质量平衡方程和能量平衡方程为基础,首次建立了火电机组热经济性分析的统一物理模型,并在此基础上,建立了火电机组热经济性分析的基础数学模型,即比内功方程、循环吸热量方程和汽水分布方程。统一物理模型的形式规范简明,数学模型形式简单统一、物理意义明确,能够适用于各种形式的火电机组。通过实例计算,验证了所建模型的正确性。为通用的热经济性在线或离线分析系统的开发奠定了基础,也为一般的热经济性分析、机组的变工况分析和制定热经济分析与能耗计算的统一标准提供了新的理论工具。

关键词: 火电机组 热经济性分析 统一物理模型 统一数学模型

Research on the Unified Physical Model and Mathematic Model of Heat-economic Analysis for the Coal-fired Power Unit

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Abstract: In order to realize the purpose of energy-saving and consumption-reducing for the coal-fired power unit, the unified physical model of heat-economic analysis was established for the first time, which was based on the mass-balance and energy-balance equations. And on the basis of the unified physical model, the basic mathematic model was also established, which was actually specific internal work equation, cycle heat absorption capacity equation and steam-water distribution equation. The unified physical model is of standard and concise form, and the mathematic model is of simple and unified physical structure, whose physical meaning is well-expressed. The physical model and the mathematic model can be suitable for various kinds of coal-fired power units, which are proved to be correct by the checking calculations. The models not only lay the foundation for designing an on-line or off-line heat-economic analysis system, but also provide a new theoretical tool for general heat-economic analysis, variable condition analysis of units and making a unified criterion for heat-economic analysis and energy consumption.

Keywords: coal-fired power unit heat-economic analysis unified physical model unified mathematic model

收稿日期 2007-10-18 修回日期 1900-01-01 网络版发布日期

DOI:

基金项目:

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