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低性能代偿损失的环境控制系统方案研究

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CONCEPT STUDY ON ENVIRONMENTAL CONTROL SYSTEMS WITH LESS FUEL PENALTIES

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摘要

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摘要 从集成能源子系统的概念出发, 提出了一种以环控系统为核心的热能管理组合方案。建立了该组合方案在巡航模式下工作时的数学模型, 对其参数匹配的方法进行了探讨。并对主要附件性能的影响进行了分析。

关键词: 环境控制系统 性能系数 燃油代偿损失 集成能源子系统

Abstract: Future high performance military fighter aircraft will demand an Environmental Control System (ECS) with more cooling capacity, lower weight, and lower fuel consumption. Subsystems integration technologies could provide benefits such as these for future military aircraft. This paper introduces a new integration concept which integrates all aircraft and energy power and cooling systems into a Thermal and Energy Management Module (T/EMM). The T/EMM is the heart of the concept and consists of heat exchangers, compressor, cooling turbine and power turbine with a generator, hydraulic pump, combustor and controls. It could provide the cooling function and power traditionally performed separately by an ECS and other subsystems. A mathematical model for this system in cruise mode is established. The computes are completed under the same flight conditions as advanced F 15. And the effects of parameters of several accessories are investigated. The calculated results show that the integrated ECS has more Coefficient of Performance (COP) and less related fuel penalties than the advanced F 15 ECS.

Keywords: environmental control system coefficient of performance fuel penalty integrated energy subsystems

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