

Thermal-Electrical Modeling and Adaptive Control of Battery Charge/Discharge Systems

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Abstract

The ever increasing complexity and integration of systems together with the explosive growth of electronics and computational communications have led to higher demands for energy, as recognized by the SAE ARP 4754 on complex or highly integrated systems. Electrical power conditioning and distribution is one of the vital functions in many types of systems, among which stands out the charging and discharging of batteries. In such systems, it's been known that incorrect handling can lead to thermal runaway as already experienced in aerospace, aviation, automotive and portable consumer devices industries. In this article we intend to discuss and model a battery charging/discharging system currently in use in the CBERS (China-Brazil Earth Resource Satellite), to future develop an adaptive control that autonomously adjust control parameters as system degrades and operating conditions changes, in such a way that the thermal runaway phenomenon is avoided, decreasing the risk of accidents and failures in that type of systems.

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