

A Li-ion Battery Discharge Model

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Abstract

In this paper, a Simulink model for describing the Li-ion battery discharge behaviors is proposed. This model describes the response of the open-circuit voltage and closed-circuit voltage to time in the discharge process of the Li-ion battery. The Li-ion battery discharge behavior is divided into three parts: initial transient state part, steady state part, and tail transient state part. The initial transient state and the steady state parts are described by using a RC circuit respectively while a nonlinear voltage source is used to describe the tail transient state part. In addition, this model has an equivalent series resistance, used to make the electrical resistance value of the electrodes and the guard circuit equivalent. Finally, a Panasonic 18650 Li-ion battery Simulink model is implemented to verify the feasibility of the proposed method. The results of experiments and simulations show that the Li-ion battery Simulink model can accurately describe the response of the open-circuit voltage and closed-circuit voltage to time in the discharge process.

Key words : Li-ion battery;Initial transient state part;Steady state part;

Tail transient state part;Simulink model