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EQUIVALENT MODEL AND PARAMETER IDENTIFICATION OF GRAPHENE SUPERCAPACITOR BATTERY FOR SPACECRAFT

Abstract

Graphene supercapacitor (GSC) battery provides a new choice for the design of spacecraft batteries due to its high specific energy, high specific power, long life and excel-lent environmental adaptability. In this study, an equivalent model was established to accu-rately reflect its static and dynamic performance. In the modeling, the dual characteristics of graphene supercapacitor and electrochemical cell are considered, and the parameters of the model are identified by adaptive recursive least square method with forgetting factor. In or-der to verify the validity and accuracy of the model and parameter identification, experi-ments were carried out on the battery under different power and working conditions, and then the traditional second-order resistance-capacitance (RC) and the muti-order traditional supercapacitor equivalent circuit model were compared with the model. The experimental data fitting results show that the accuracy of the equivalent circuit model and the corre-sponding parameter identification method proposed in this paper is much better than the tra-ditional second-order RC model and the second-order traditional supercapacitor model, and it is expected to be applied to the power design of spacecraft.