

Evaluating Performance and Reliability of Storage System with Supercapacitors: Application in Trolleybuses*

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Abstract:

The objective of this work is to study and design a module of super capacitors for recovering the braking energy in trolleybuses. The module of super capacitors is charged and discharged by Buck-Boost converter that is reversible in current. The control and the smoothing elements of the converter are designed with taking into account the non-linear nature of super capacitors. To recover quickly the braking energy, the module is charged with constant current, while the discharging is done with constant voltage on the DC link of trolleybus. The module of super capacitors in its different operations (starting up, powering auxiliary equipments, braking) is simulated in the SIMPLORER environment. As a result, the different operating values (as voltage, current and temperature) are determined for the elements of the studied module (diodes, IGBTs, capacitor, super capacitors). Finally, the failure rate and the reliability of the module elements are estimated depending on the different operating factors. The module faults is analyzed.

Keywords: Module of supercapacitors, braking energy, converter, constant current, constant voltage, reliability, failure rate, analyzing faults.

* For the paper in Arabic see pages (257-274)

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