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Study on supercapacitor equivalent circuit model based on the simulation

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This paper proposes a design of supercapacitor equivalent circuit model and a new frequency domain based parameter identification method is described in detail. The super capacitor, also known as electrochemical double layer capacitor, is a storage device which has a very high power density compared to conventional battery and is capable of storing a large amount of electrical energy in short time periods. As an excellent quick energy storage device, supercapacitors or ultracapacitors are reversible energy storage devices that has instantaneous power densities more significant than batteries and energy densities larger than dielectric capacitors. From this principle, this paper represents a RC model of super capacitor to describe its different dynamics of operation during the charging, discharging and rest phases. The design method for circuit parameters and corresponding equalization control algorithm were introduced. The equivalent circuit model of super capacitor is established through MATLAB, according to the established simulation model of super capacitor in the process of charging and discharging voltage curve, and compared with the experimental data. The simulation and experiment shows that this method with high precision can realize quick equalization and meet the demand of charging and discharging with high current. The experimental and simulation results are presented to verify the analysis.

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