

电机电工

## 超级电容器-电池复合脉冲电源系统的试验研究

张丹丹<sup>1</sup>; 罗曼<sup>2</sup>; 陈晨<sup>1</sup>; 何俊佳<sup>1</sup>

华中科技大学电气与电子工程学院<sup>1</sup>

中国长江电力股份有限公司<sup>2</sup>

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摘要

超级电容器是能量密度和功率密度介于电池和静电电容器之间的新型储能元件, 在作为能量储存元件应用于脉冲电源方面有独特的优势。该文采用超级电容器和电池组成复合能源系统, 研究了其用作脉冲功率源的特性。研究表明, 这种复合电源系统的工作过程是: 当回路导通时, 电池和超电容同时提供负载电流, 回路断开时, 电池对超电容充电; 采用超级电容器可补偿电池电流, 缓解电池输出大电流的压力, 并使得电池端电压下降减少, 内部损耗减少, 进而增加电容器的寿命; 超级电容器对电池的补偿作用与脉冲占空比、脉冲周期、超级电容器的内阻、电池内阻、电容器容量和数量有密切关系。占空比增大时, 电池电压降落增大, 超级电容器提供的电流减少, 电池的负担增大, 但并联超级电容器对降低电池电压降落的改善更加明显; 并联的超级电容器数目增大, 提供的电流也增大。

关键词 [超级电容器](#) [电池](#) [复合电源](#)

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## Experimental Study on Composite Power Source of Supercapacitor-battery

Abstract

Supercapacitor, a new energy storage device, which possesses higher energy density than electrostatic capacitor and higher power density than battery holds the upper hand when applied as pulse power sources. Composite power source consisted of supercapacitor and battery is presented and its performance is studied. The results show that current of load is supplied by battery and supercapacitor simultaneously when circuit is turned on and supercapacitor is charged by battery when circuit is turned off. Supercapacitor can compensate current of battery and decrease drop of battery voltage, thus lead to extension of life of battery. These effects on battery are related to pulse duty ratio, period of pulsed current, internal resistance of battery and supercapacitor, capacitance and number of supercapacitor. When pulse duty ratio increases, drop of battery voltage increases and current supplied by supercapacitor decreases which augment duty of battery. The battery voltage drop, however, will decrease more if more supercapacitors are connected to the batteries in parallel due to much current is supplied by the supercapacitors.

Key words [supercapacitor](#) [battery](#) [composite power source](#)

DOI:

通讯作者 张丹丹 [dandanzh6168@sina.com](mailto:dandanzh6168@sina.com); [dandanzh6168@sina.com](mailto:dandanzh6168@sina.com), [dandanzh@public.wh.hb.cn](mailto:dandanzh@public.wh.hb.cn)

作者个人主页 张丹丹 罗曼 陈晨 何俊佳

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