

Energy Management Method in DC Microgrid Based on the Equivalent Hydrogen Consumption Minimum Strategy

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Abstract : An energy management method based on equivalent hydrogen consumption minimum strategy is proposed in this paper aiming at the direct-current (DC) microgrid consisting of photovoltaic cells, fuel cells, energy storage devices, converters and DC loads. The rational allocation of fuel cells and battery devices is achieved by adopting equivalent minimum hydrogen consumption strategy with the full use of power generated by photovoltaic cells. Considering the balance of the battery's state of charge (SOC), the optimal power of the battery under different SOC conditions is obtained and the reference output power of the fuel cell is calculated. And then a droop control method based on time-varying droop coefficient is proposed to realize the automatic charge and discharge control of the battery, balance the system power and maintain the bus voltage. The proposed control strategy is verified by RT-LAB hardware-in-the-loop simulation platform. The simulation results show that the designed control algorithm can realize the rational allocation of DC micro-grid energy and improve the stability of system.

Keywords : DC microgrid, equivalent minimum hydrogen consumption strategy, energy management, time-varying droop coefficient, droop control

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