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Fast Charging Station for Electrical Vehicles Based on DC Microgrid by using Fuzzy Logic Controller

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Abstract: *The rapid adoption of electric vehicles (EVs) has heightened the need for fast charging stations that can meet high-power demands efficiently. Conventional charging methods struggle with long durations and grid instability, especially when charging multiple vehicles simultaneously. This paper presents a fast charging station powered by a DC microgrid integrated with renewable energy sources, particularly solar photovoltaics (PVs), to mitigate the impact on the power grid. A fuzzy logic controller (FLC) is employed to regulate charging process, optimizing energy flow based on battery state-of-charge (SOC) levels. By utilizing a multistep constant current charging algorithm, the proposed system ensures faster charging while maintaining battery health. Simulation results demonstrate significant reductions in grid voltage dips and transformer overheating. A software validates the proposed methodology, highlighting the system's potential for sustainable EV charging infrastructure*

Keywords: solar, boost converter, Electric vehicle, charging station, Inverter, Fuzzy logic controller

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