Abstract

With the development of renewable energy sources, microgrid is widely implemented because of its flexibility and the high-efficiency. There are always two concerns in the microgrid. The first one is power sharing. Generally, the output of the generator is proportional to its capacity to reach the highest efficiency. The well-known droop control can ensure proportional active and reactive power shared among parallel power converter system. However, its feasibility can be seriously influenced by some additional factors, such as line impedance mismatch and sensor error. Thus, in this report, the power sharing of the droop control with various disturbance is fully discussed and the corresponding method to mitigate the sharing error is proposed. The other concern is power quality. The effectiveness of droop control is limited in the fundamental-frequency domain and cannot address the harmonic issues. However, according to previous studies, the harmonic currents generated by nonlinear loads can distort the point of common coupling (PCC) voltage. It is also shown that apart from nonlinear loads, switching deadtime can also introduce circulating current harmonics. To simultaneously suppress the circulating current harmonics and mitigate the PCC voltage harmonics, a novel control strategy is proposed based on virtual harmonic impedance controls. The feasibility of the proposed control strategy is verified through the experiments.

Publication

1. **J. Liu**, Y. Qi, and Y. Tang, "Mitigating the Harmonics of Parallel-Inverter Systems Considering Nonlinear Loads and Deadtime," in 2018 IEEE Energy Conversion Congress and Exposition (ECCE), 2018, pp. 5559-5564.
2. Y. Qi, J. Fang, **J. Liu**, and Y. Tang, “Coordinated Control for Harmonic Mitigation of Parallel Voltage Source Inverters,” CES Trans. Electrical Machines and Systems, in the press.