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Research on Improvement of Power Quality Problem in Photovoltaic Grid-connected System

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With the exhaustion of fossil oil and environment pollution, the development of renewable clean energy pays more attention. Solar energy becomes the main development direction in the world energy field because of its inexhaustible and non-pollution. At present, PV generation is widely used in power system, which causes the change of structure and control mode of grid. PV itself intermittent output characteristic brings the traditional power grid disturbances as well as power quality problems. The research of photovoltaic grid-connected system power quality problems is an important prerequisite to ensure safe and reliable economic operation of power system. Based on the research of improvement to PV system power quality, this paper analyzes the impact of output filters and control strategy of PV grid to the power quality. And this paper proposes an improved filter, which can effectively attenuate harmonic components around switching frequency of grid current. Combining the improved filter and control strategy, the injected current quality of grid is significantly improved and the performance of PV system well improved also. This paper introduces the structure and characteristics of photovoltaic power grid system, and based on the existing output LCL filter, the paper puts forward a new LCL-LC filter by increasing a series LC branch to the LCL filter and gives a simple way to design the new LCL-LC filter. As to the LCL-LC filter, two control schemes are proposed based on capacitive current feedback active damping dual loop control strategy. The theoretical study and simulation result show that LCL-LC filter can well reject the switching frequency harmonics. This paper does the simulations of output filter and control strategy using Matlab/Simulink simulation environment, and compares the effect and structure with LCL filter. The results of simulation show that the improved methods can effectively improve power quality of PV grid-connected system.

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