Design of a Solar Fed Phase Shift Full Bridge Converter for Microgrid

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Abstract:
The work suggests utilising the different optimization techniques to design a solar power fed Phase Shift Full Bridge (PSFB) DC-DC converter to feed a 48 Volt DC microgrid which can be used to satisfy the voltage levels of household appliances. Microgrid is a compact network of electricity consumers with a nearby power source that is typically connected to a centralised grid but has the capacity to operate on its own. These Solar-powered fed PSFBs can also be used to charge these batteries. Solar energy is employed as the converter's input source since it is abundant and simple to install, making it a viable renewable energy source. A MPPT approach is used to get the most power out of PV panels. The duty cycle of the switching signals produced by the MPPT control algorithm are sent to the converter. Salp Swarm Algorithm (SSA) and Emperor Penguin Optimization (EPO) serves as the control algorithm in this situation. They are metaheuristic algorithm that makes sure the PV panel functions at the best voltage and current in order to harvest the most electricity under all climatic situations. The remainder of the solar energy is used to charge the battery when the converter reaches the desired power. By Using Matlab 2015a/Simulink, the overall system efficiency is calculated based on the metaheuristic approach utilised for MPPT tracking. This article suggests a solar-powered fed PSFB that is SSA and EPO based, which works well as an approach for feeding the energy source to the microgrid and battery.

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Contents

Solar photovoltaic (PV) is a DC renewable energy source, and the current topology links such energy source to the infrastructure for power distribution while necessitating the use of DC-DC converters. As the production of electronic home appliances rises quickly in both homes and workplaces, a DC-DC converters helps in converting the solar power to required power needed to feed a microgrid. While most home appliances are directed towards electronic-based loads, the majority of the current battery-based on-grid or off-grid PV systems are still dependent on an AC environment for power distribution for load. It is time to consider how electronic-based appliances use energy, particularly in uses for PV systems, in order to save more energy.

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