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Abstract
This thesis presents four structures of DSP based single phase AC voltage regulator. The considered structures can be divided into two types: series compensation type and voltage adjustable type. The series compensation type includes a low frequency isolated transformer, and can be put into half-bridge topology and small DC capacity topology. The half-bridge topology is composed of a power factor correction (PFC) stage and an inverter stage, while the small DC capacity topology is composed of a diode rectifier and an inverter, as well as a much simpler control method. The efficiency of half-bridge topology is about 90%, while that of the small DC capacity topology may be up to 95%. These two topologies maintain the load voltage by way of regulating the inverter output voltage through the low frequency isolated transformer to compensate the source voltage variations. The voltage adjustable type can also be put into three-arm topology and half-bridge topology. The efficiency of three-arm structure is also up to 95%, while that of the half-bridge is about 90%. Both two topologies consist of a PFC stage and an inverter stage, where the former stage regulates the dc bus voltage and the later stage maintaining the load voltage. Finally, four prototypes of l kW rating related to these topologies have been setted for experiments to prove the practicability.
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