

A novel filter for three-phase power factor correction voltage feedback loop under heavy DC voltage ripple condition

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Abstract: THD and the amplitude balance of three-phase input current are an important index for the performance of three-phase power factor correction (PFC). In general, when the hardware and the load of three-phase PFC are confirmed, the THD and amplitude balance of three-phase input current mainly depend on voltage and current feedback loop of PFC. Firstly, this paper designs the traditional voltage and current feedback loop for three-phase PFC according to traditional small signal theory. Secondly, this paper studies the designing difficulty of large dc voltage ripple for PFC voltage controller and puts forward a new dc voltage ripple filter which can eliminate the ac component of sampling dc bus voltage. Finally, this paper proposes a novel filter with dc voltage ripple frequency adaption function to copy with the frequency variety of the voltage ripple caused by the change of the output inverter frequency. With the help of the proposed algorithm the distortion of three-phase 3 input current reference decreases rapidly, therefore, the low THD and good amplitude balance of three phase input current will be achieved.

Keywords: PFC, filter, harmonic, THD (total harmonic distortion)

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