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Chapter 14 - Polyphase Converters and Applications

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Abstract

Multiphase converters refer to converters with more than three phases and are the extension of three-phase converters by adding extra legs. From hardware point of view, as such there is no major difference between a three-phase and a multiphase converter except the number of legs. However, control becomes more flexible and complex, and higher degrees of redundancies are available. Multiphase power converters have gained popularity in the last decade because of the developments in the field of high-power switching devices and computational platforms such as high-speed digital signal processors (DSPs) and high-density field-programmable gate arrays (FPGAs). The major thrust in the area of multiphase converter is seen due to concern in developing clean transportation systems, renewable energy generation system (especially wind energy system), and high-reliability variable-speed electric drive system. Multiphase power converters are used in numerous applications depending upon their role as to convert AC to DC, DC to AC, AC to AC, or DC to DC. The major applications of DC to AC converters are found in adjustable-speed drives, while AC to AC and AC to DC are employed in multiphase renewable energy generation system. Multiphase DC-DC converter finds its application in automotive industry.

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