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Inverters

6.1 INTRODUCTION

Inverter is a device that converts a dc power into ac power at desired output voltage and frequency. In modern times this conversion is achieved either by *forced commutated* thyristors or other controllable turn-on-turn-off devices like BJT, MOSFET, IGBT, MCT, GTO etc. In the following text fundamental circuits of transistorised or thyristorised inverters will only be discussed.

6.2 INVERSION

A full controlled converter can be used as an inverter. With continuous load current, considering the firing delay angle to be extended from a low value it will give interesting results. Upto a delay of 90° (*i.e.*, $\alpha < 90°$), the converter operates in the rectifying mode at $\alpha = 90°$, the dc mean output voltage is zero (remember the mean output voltage V_{dc} of the converter is $V_{dc} = \frac{E_m}{\pi} \cos \alpha$, where E_m is the peak input ac voltage for the single phase operation) and delay beyond $\alpha = 90°$ would result in the waveform having a net negative value till α approaches 180°. Waveform at $\alpha = 180°$ will again have net zero value though it is reversed. In case we have an active dc source at the output side of the converter (say a battery), similar to the active ac source at the input, for $90° < \alpha < 180°$, the dc mean voltage is negative which means that the current flows in reversed direction for each phase through the converter and the power is being fed back to the ac source from the dc source. This is called *inversion*.

In order to illustrate the process of inversion, a three phase converter (Fig. 6.1) is assumed.