Step Down Chopper

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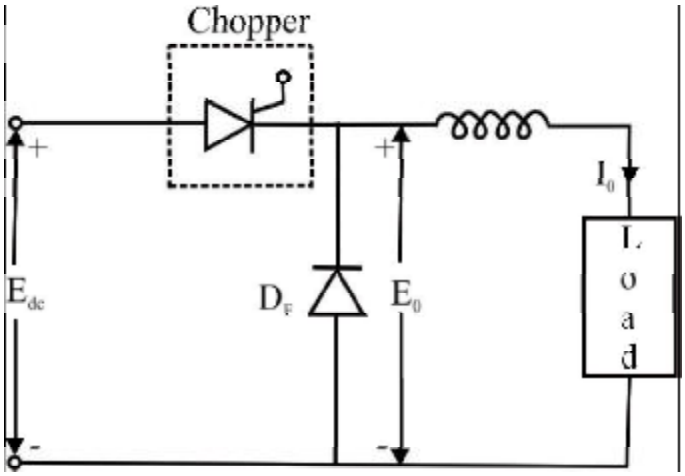
A Chopper is simply an ‘on-off’ switch that either connects load to the supply or disconnects load from the supply and produces a chopped load voltage from a constant input supply. Figure shows the basic principle of Choppers.



Chopper Circuit
Figure 1

From the above figure it is clear that the SCR is triggered periodically and is kept conducting for a period T_{on} & is blocked for a period T_{off}. The chopped load voltage waveform is as shown in figure no. 2.

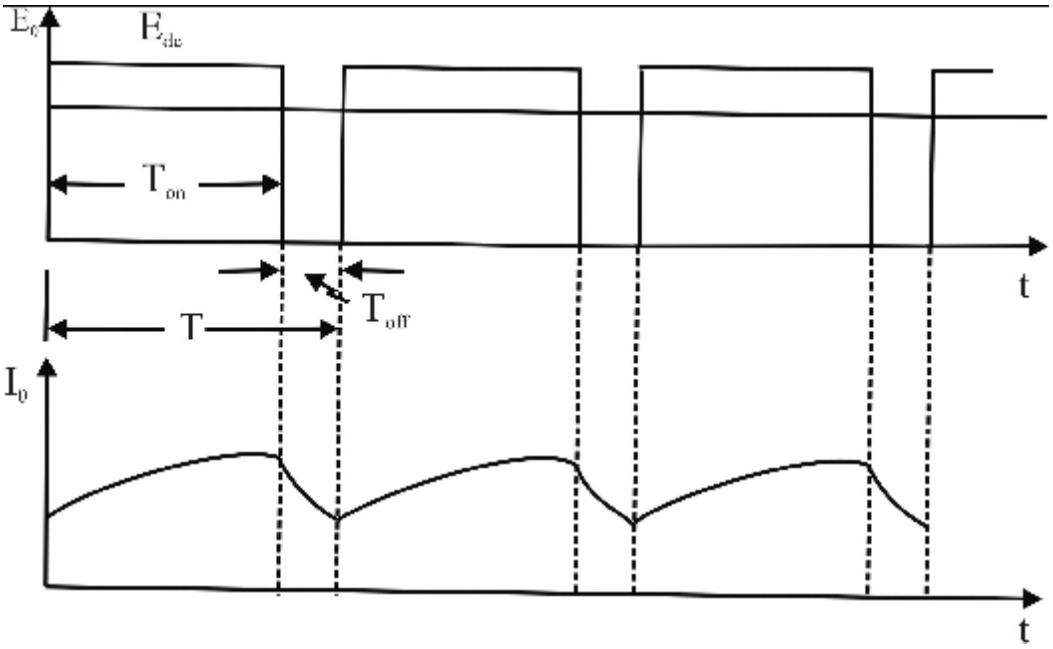


Figure 2

During the period T_{on}, when the chopper is on, the supply terminals are connected to the load terminals. & during the period T_{off}, when the chopper is 'Off", the load current flows through the Freewheeling Diode D_F. As a result, load terminals are short circuited by D_F & voltage therefore becomes zero during Toff. In this manner, a chopped DC voltage is produced at the load terminals. The average load-voltage E_o is given by

$E_o = E_{dc} (T_{on}/T_{on}+T_{off})$ Where

T_{on} = 'On' time of the chopper.

To_{ff} = 'Off' time of the chopper.

$T (T_{on}+T_{off})$ = Chopping period

If $\alpha = T_{on}/T$ be the duty cycle then above equation becomes,

$E_o = E_{dc} \times (T_{on}/T)$

$E_o = E_{dc} \times \alpha$

Thus the load voltage can be controlled by varying the duty cycle of the chopper.