LECTURE 27

Performance Parameters

- The thyristor requires a certain minimum time to turn *ON* and turn *OFF*.
- Duty cycle *d* can be varied only between a min. & max. value, limiting the min. and max. value of the output voltage.
- Ripple in the load current depends inversely on the chopping frequency, *f*.
- To reduce the load ripple current, frequency should be as high as possible.

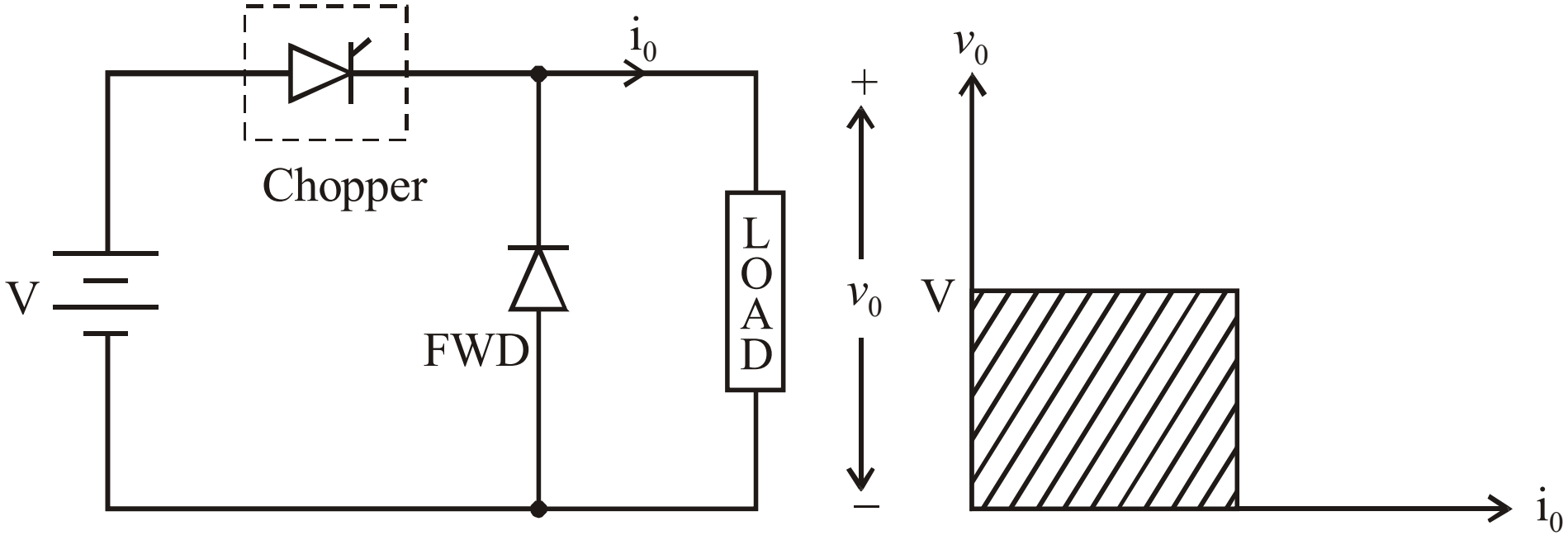
Problem

- *A Chopper circuit is operating on TRC at a frequency of 2 kHz on a 460 V supply. If the load voltage is 350 volts, calculate the conduction period of the thyristor in each cycle.*

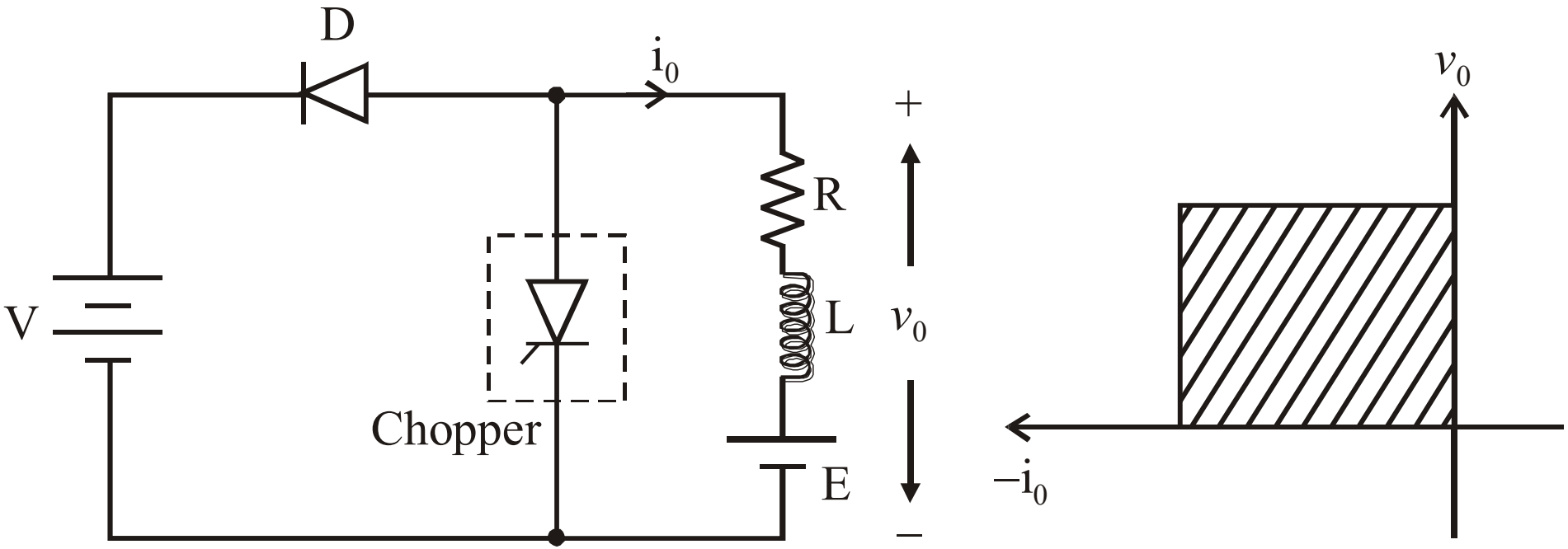
Classification Of Choppers

- Choppers are classified as
  - Class A Chopper
  - Class B Chopper
  - Class C Chopper
  - Class D Chopper
  - Class E Chopper

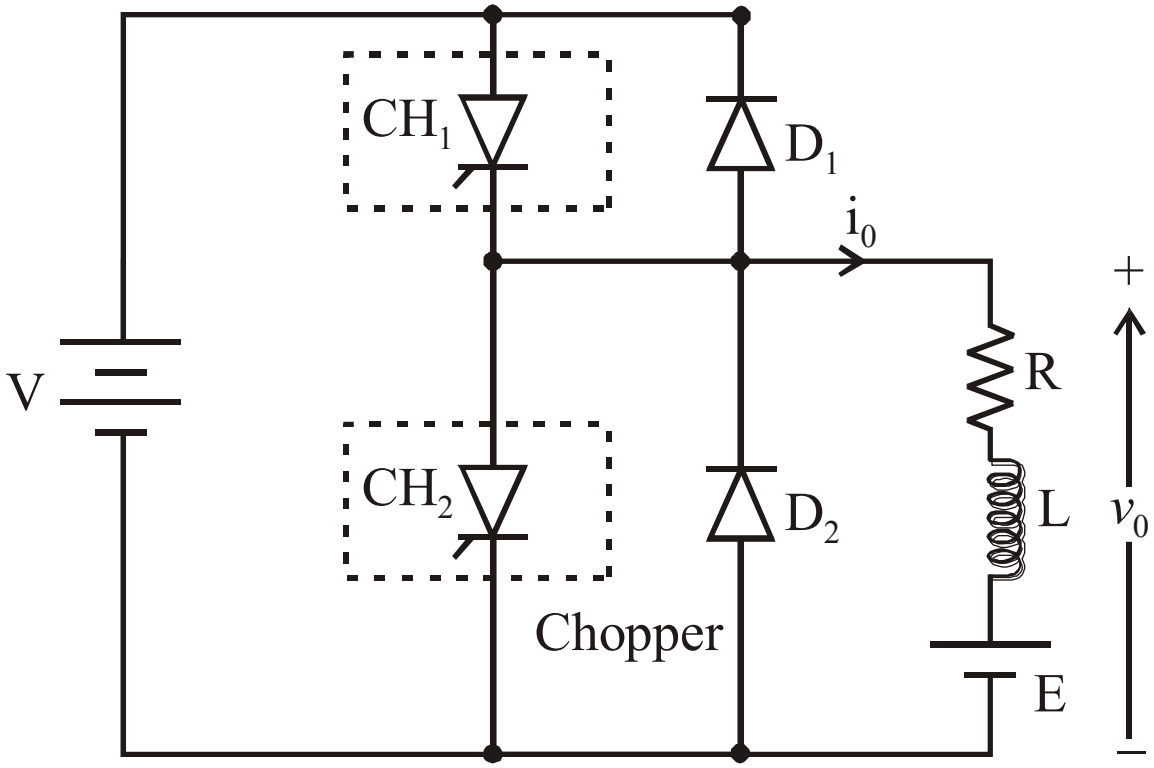
Class A Chopper

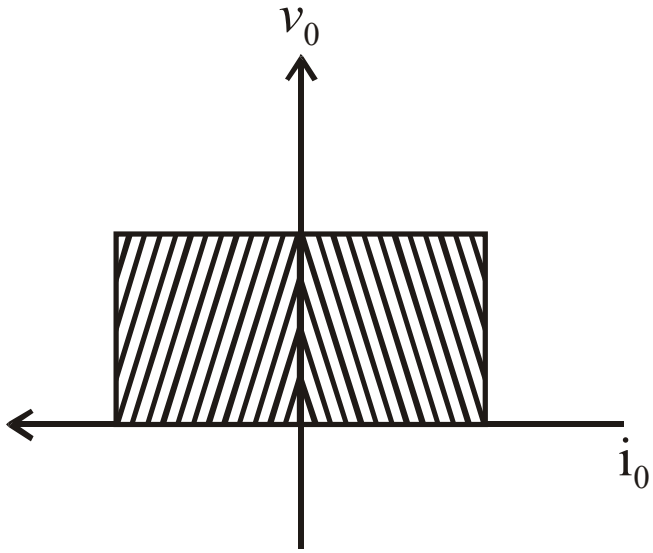


Class B Chopper



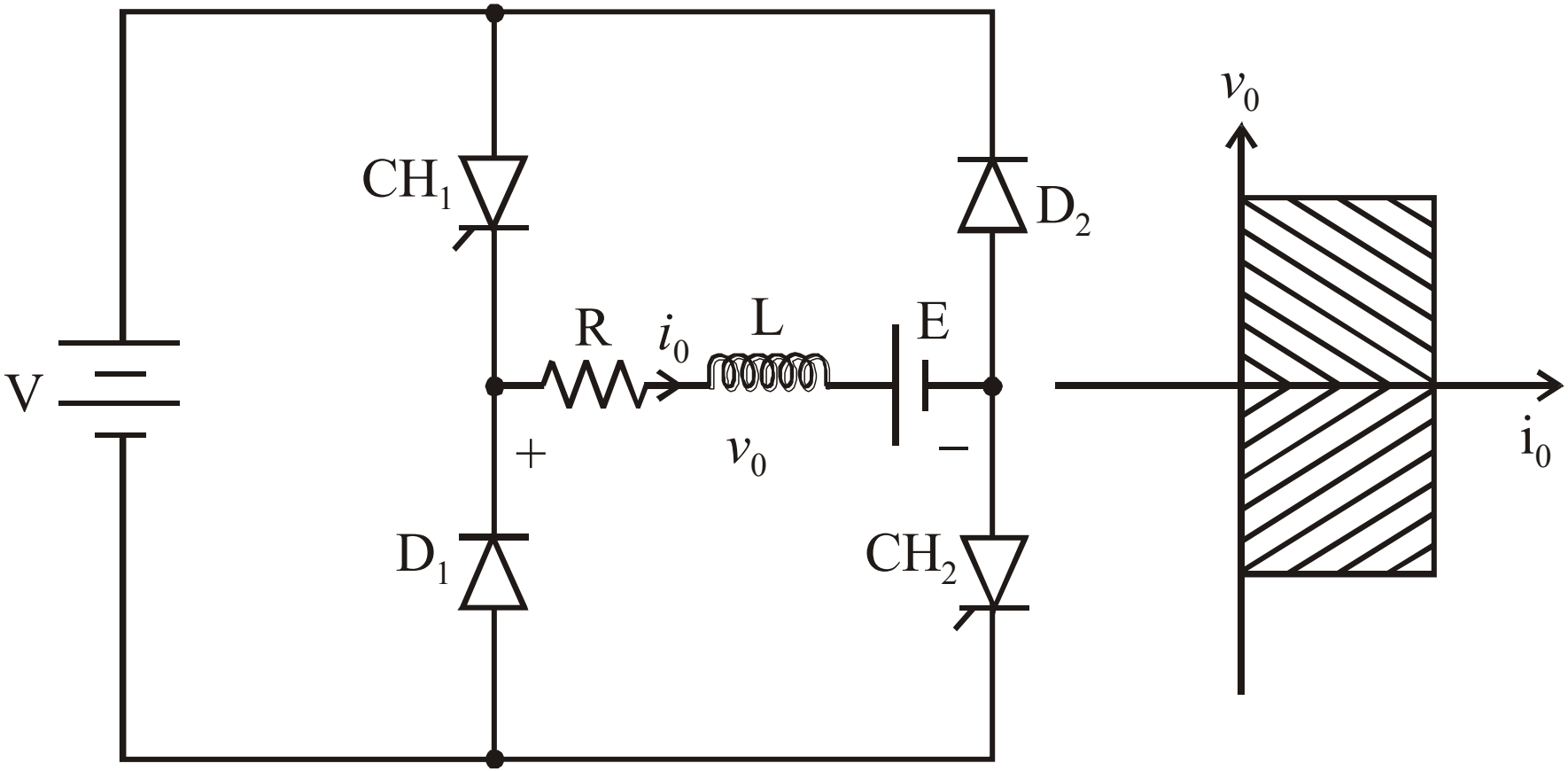
Class C Chopper





- *Class C Chopper* is a combination of *Class A* and *Class B Choppers*.
- For first quadrant operation, CH_1 is ON or D_2 conducts.
- For second quadrant operation, CH_2 is ON or D_1 conducts.
- When CH_1 is ON, the load current is positive.
- The output voltage is equal to *'V'* & the load receives power from the source.
- When CH_1 is turned OFF, energy stored in inductance *L* forces current to flow through the diode D_2 and the output voltage is zero.

Class D Chopper



- Class D is a two quadrant chopper.
- When both CH_1 and CH_2 are triggered simultaneously, the output voltage $v_O = V$ and output current flows through the load.
- When CH_1 and CH_2 are turned OFF, the load current continues to flow in the same direction through load, D_1 and D_2 , due to the energy stored in the inductor L.
- Output voltage $v_O = - V$.

- Average load voltage is positive if chopper ON time is more than the OFF time
- Average output voltage becomes negative if $t_{ON} < t_{OFF}$.
- Hence the direction of load current is always positive but load voltage can be positive or negative.

Class E Chopper