Class C Commutation

Commutation: Commutation is the process of turning Off, a conducting thyristor is called Commutation

Class C-Complementary Commutation (switching a charged capacitor by a load carrying SCR):

The class C commutation circuit is shown in Fig.1. In this method, the main thyristor (SCR T1) that is to be commutated is connected in series with the load. An additional thyristor (SCRT2), called the complementary thyristor is connected in parallel with the main thyristor.

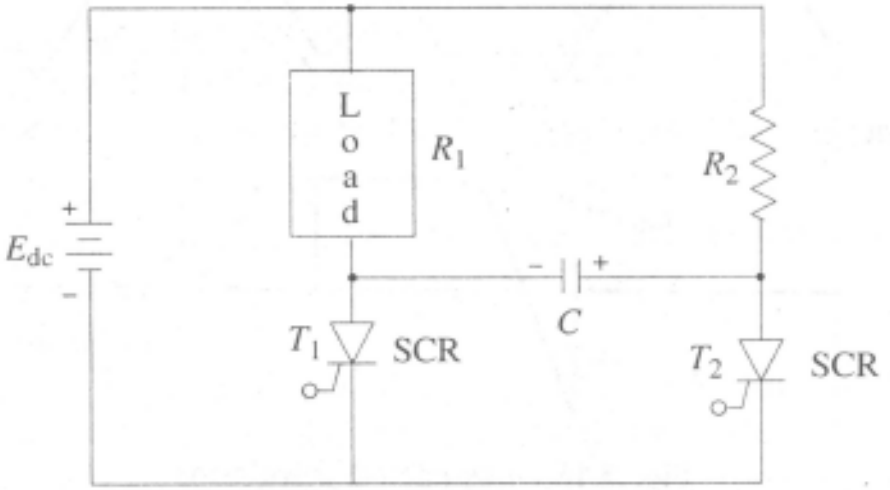

Fig.1

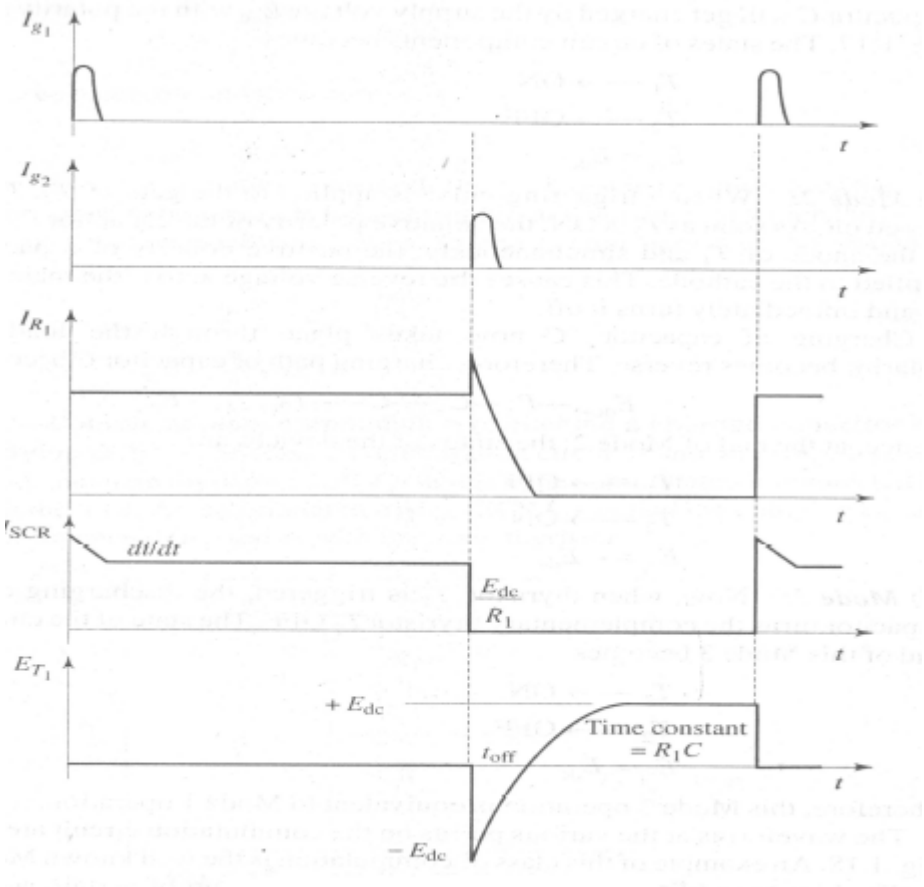

Fig.2

Circuit Operation

(a) Mode 0:

[Initial-state of circuit] Initially, both the thyristors are OFF. Therefore, the states of the devices are

T1-OFF

T2- OFF

.. $Ec_1=0$

(b) Mode 1:

When a triggering pulse is applied to the gate of T1, the thyristor T1 is triggered. Therefore, two circuit current, namely, load current IL and charging current Ic start flowing. Their paths are:

Load current IL;

Edc_+—R1—T1—Edc_-

Charging current Ic;

Edc_+—R2—T1—C_+—C_-—Edc_-

Capacitor C will get charged by the supply voltage Edc with the polarity shown in Fig. 1. The states of circuit components becomes

T1-ON

T2- OFF

$Ec_1 = Edc$

(c) Mode 2:

When a triggering pulse is applied to the gate of T2, T2 will be turned on. As soon as T2 is ON, the negative polarity of the capacitor C is applied to the anode of T1 and simultaneously, the positive polarity of capacitor C is applied to the cathode. This causes the reverse voltage across the main thyristor T1 and immediately turns it off.

Charging of capacitor C now takes place through the load and its polarity becomes reverse. Therefore, charging path of capacitor C becomes

Edc_+—R1—C_+—C_-—T2 $_{(a\_k)}$— Edc_

Hence, at the end of Mode 2, the states of the devices are

T1-OFF

T2-ON

Ec_1=-Edc

***(d) Mode* 3:**

Now, when thyristor T1, is triggered, the discharging current of capacitor turns the complementary thyristor T2 OFF. The state of the circuit at the end of this Mode 3 becomes

T1- ON

T2- OFF

$Ec_1 = Edc$

Therefore, this Mode 3 operation is equivalent to Mode 1 operation.

The waveforms at the various points on the commutation circuit are shown in Fig. 2. An example of this class of commutation is the well known McMurray Bedford inverter. With the aid of certain accessories, this class is very useful at frequencies below about 1000 Hz. Sure and reliable commutation is the other characteristic of this method.