Class B COMMUTATION OF THYRISTOR

Circuit Simulated by Ms. Kimberly Gemina Morais
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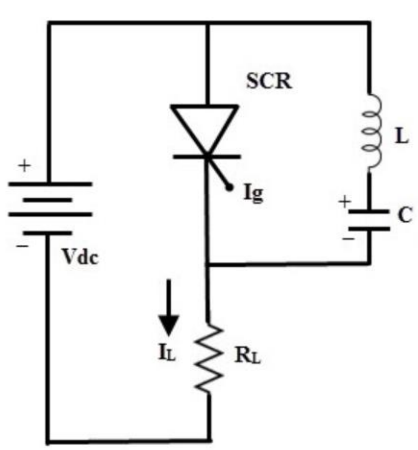
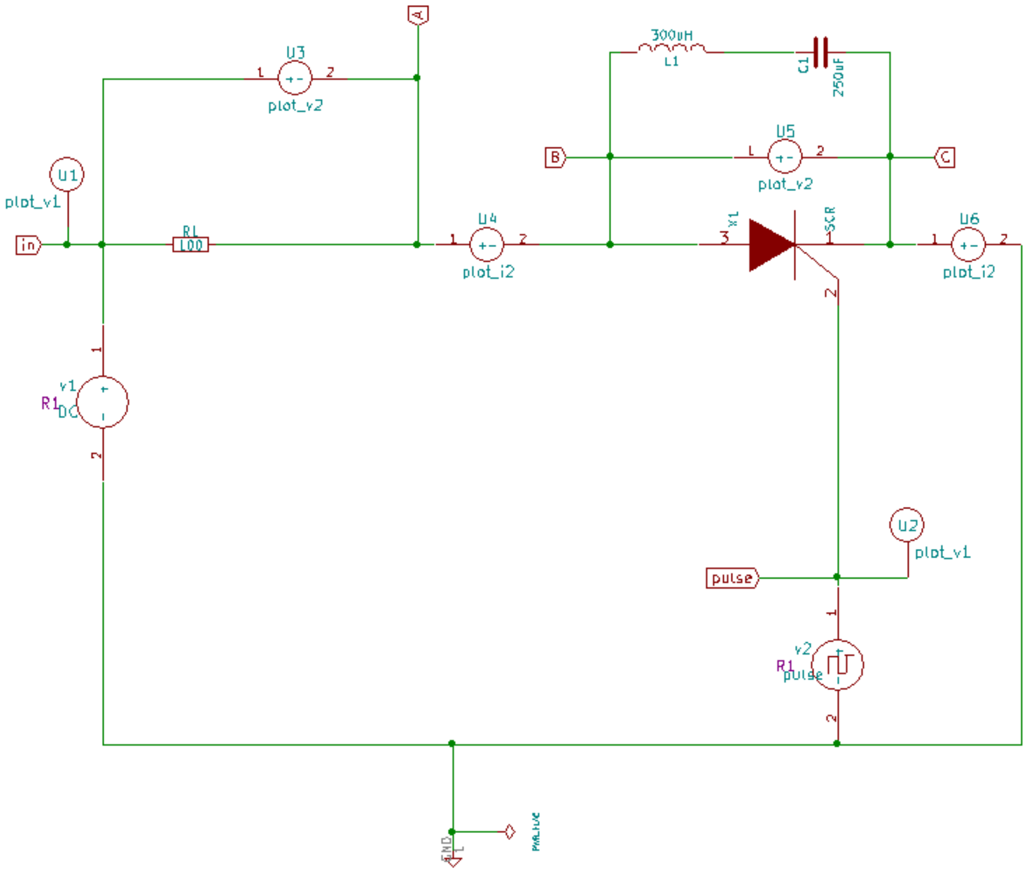
A thyristor can be turned ON by applying a positive voltage of about a volt or a current of a few tens of milliamps at the gate-cathode terminals. However, the amplifying gain of this regenerative device being in the order of the 10^8 , the SCR cannot be turned OFF via the gate terminal. Once the SCR is turned ON, it remains ON even after removal of the gate signal, as long as a minimum current, the Holding Current, I_H, is maintained in the main or rectifier circuit. It will turn-off only after the anode current is annulled either naturally or using forced commutation techniques. The thyristor will turn off naturally with ac supplies as the voltage reverses. (which is called natural commutation). No such reversal occurs in DC supplies and it is necessary to force a voltage reversal if turn-off is to occur. This process is called forced commutation.

The thyristor can be turned off by reverse biasing the SCR or by using active or passive components. Thyristor current can be reduced to a value below the value of holding current. Since, the thyristor is turned off forcibly it is termed as a forced commutation process. The basic electronics and electrical components such as inductance and capacitance are used as commutating elements for commutation purpose.

Circuit Diagram for Class B commutation

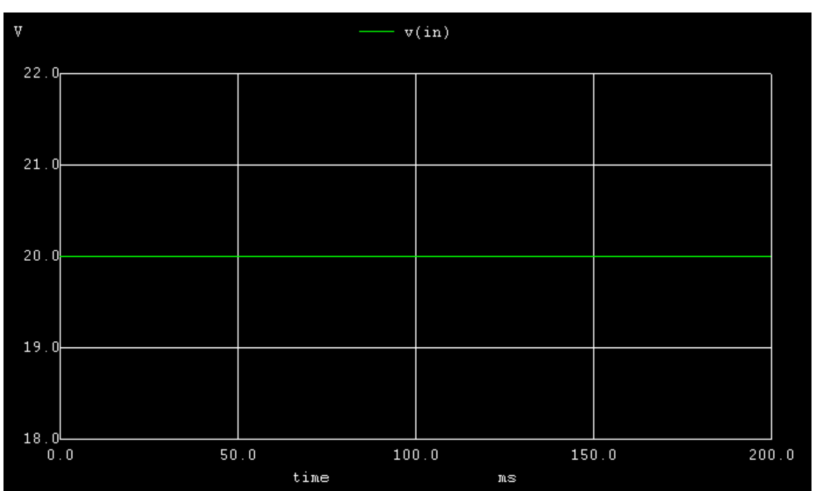


Schematic Diagram

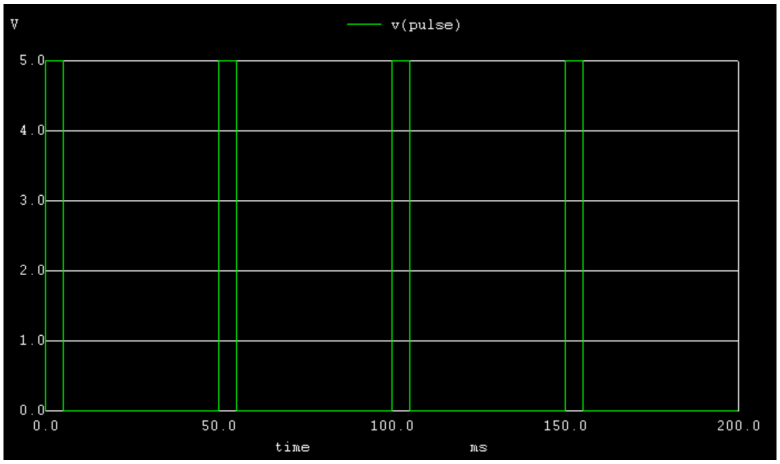


Simulation Results:

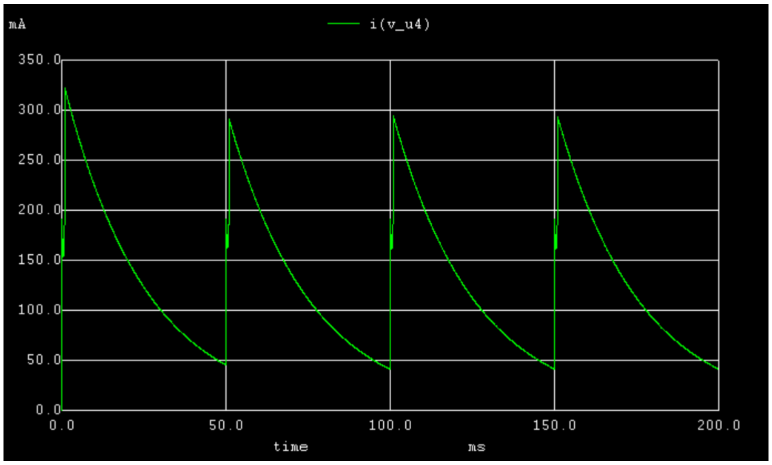
1. **Input Voltage**



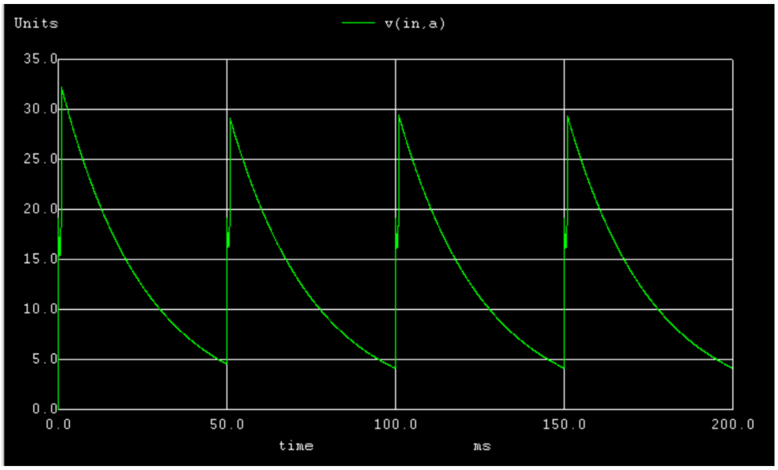
2. Pulse Signal



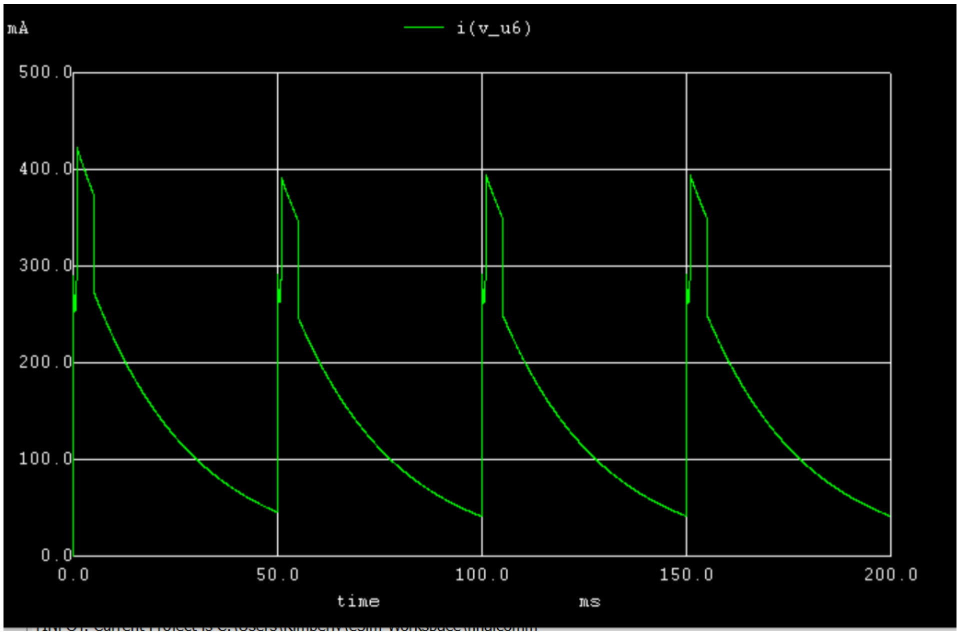
3. Load Current



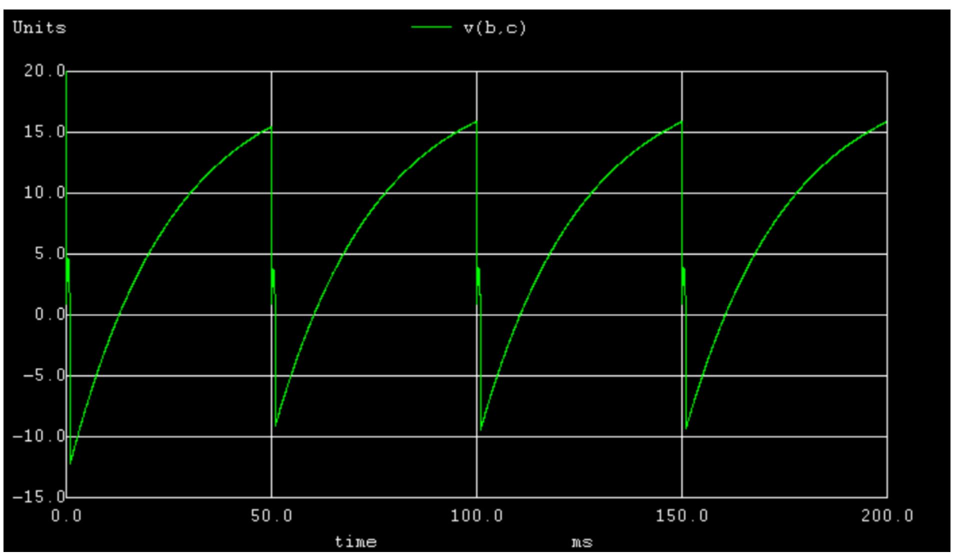
4. Load Voltage



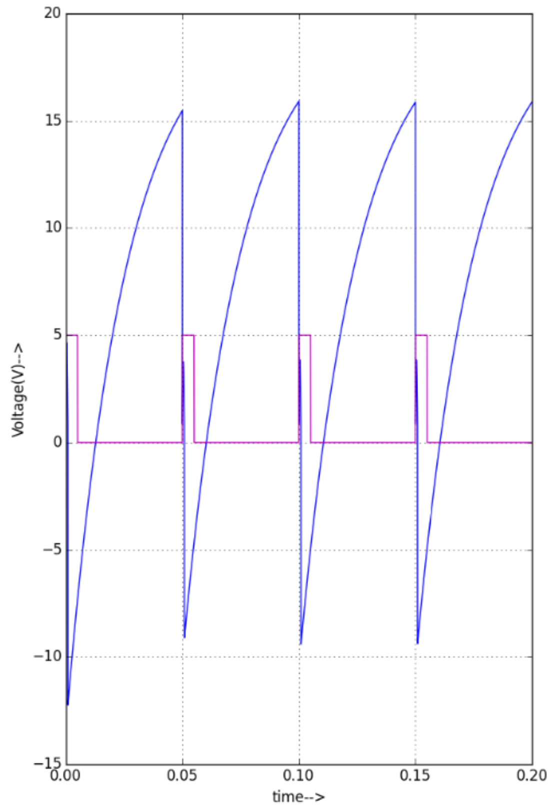
5. Current through thyristor



6. Voltage across thyristor



7. Python plots for input, pulse and voltage across thyristor



References:

1. https://nptel.ac.in/content/storage2/courses/108105066/PDF/L-19