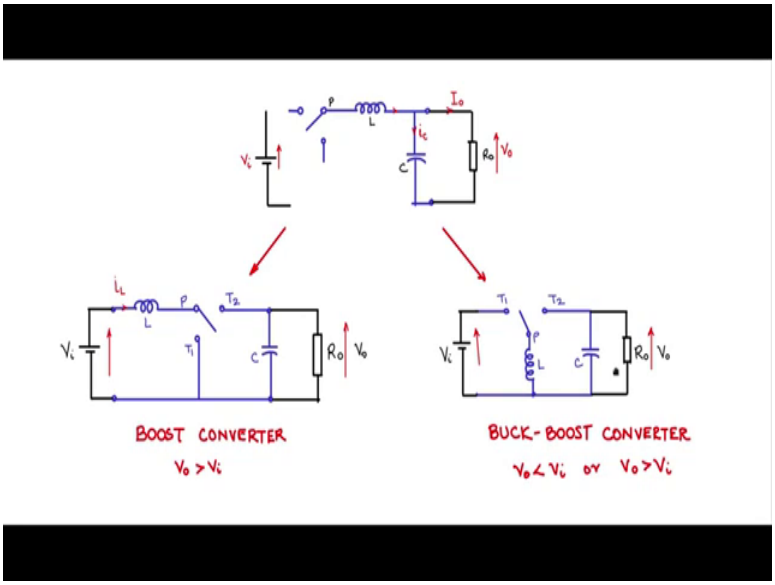
Fundamentals of Power Electronics
Prof. L.Umanand
Department Electronics Systems Engineering
Indian Institute of Science Bengalore

Lecture - 50
Primary configurations

(Refer Slide Time: 00:27)



Consider this Buck Converter topology here we used we used one SPTD switch single pole double throw switch 1 inductor and 1 capacitor, one of each of these components we can have 2 other configuration. So, let us just take only those parts see Vi will be on the inputs side the outputs side V naught we need to have a capacitor on the output side to filter to get a filtered V naught, so the capacitor will always be on the output side.

So, the position of the single pole double throw and the position of the inductor can change, however note that the inductor current cannot be discontinuous. So, the inductor cannot be on the throw side of the single pole double throw switch. If suppose the inductor was on throw 1 or throw 2 and whenever the pole was not connected to those throws, the current there would be 0 and the inductor current cannot go in a discontinuous way to 0. Therefore, it is also constraint that L has to be connected to the pole.

So, now with these constrain we have 2 other positions where we can connect the single pole double throw switch and the inductor. So, let us look at these 2 possibilities. So one

possibility is to how the inductor on the input side flip this single pole double throw and the inductor. So, if you do the flip so you have the inductor first and then comes the single pole double throw switch, like this you have the input and the output capacitor is connected to the output and to the input we have the and un regulated DC input voltage and to the output to connect the load like this and complete this single pole double throw switch connection.

Now, this is the single pole double throw switch L this is the pole this throw 1 throw 2 C Vi R naught V naught measured in this fashion Vi measured in this fashion this is iL. Now such a converter where inductor is on the input side and the single pole double throw switch is configured in this fashion is called a Boost converter.

Why it is called a boost converter will become evident shortly when we discuss the input output relationship V naught will always be greater than Vi therefore, it is called a boost converter. Then the other possibility see in the buck converter the inductor is on to the output side in the boost converter inductor is on input side one other possibilities to have the inductor connected to the ground.

So, let us do that possibility also you have the single pole double throw switch in this fashion we had a pole here, inductor connected to the pole and other end connected to the ground and the throw L end of the throw connected to the import and other end of the throw other throw connected to the output. So, complete the circuit in this fashion and you have the output Vi R naught v naught and Vi L C this is pole throw 1 and throw 2.

So, this is called a Buck Boost Converter, why it is called a buck boost converter again this will become evident that we derive the input output relationship V naught can be less then Vi or V naught can also be greater than Vi depending upon the value of the duty cycle. Therefore, this is this can do the buck operation or even boost operation therefore this converter is called buck boost converter.

So, you see in the case of the buck converter you have the inductor on the output side, in case the boost converter you have the inductor input side and the case of the buck boost converter the inductor is neither on the output nor output is in between connected to ground. In all the cases inductor is connected to the pole inductor is connect to the pole in the boost convertor also, inductor connect to the pole in the buck boost also and the capacitor is to the output connected across the output to filter the output voltage. So,

these are the 3 primary converters the buck, the boost and the buck boost converters they are called the primary converters.