Basic Electrical Circuits
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Lecture - 129
First Order RL Circuit

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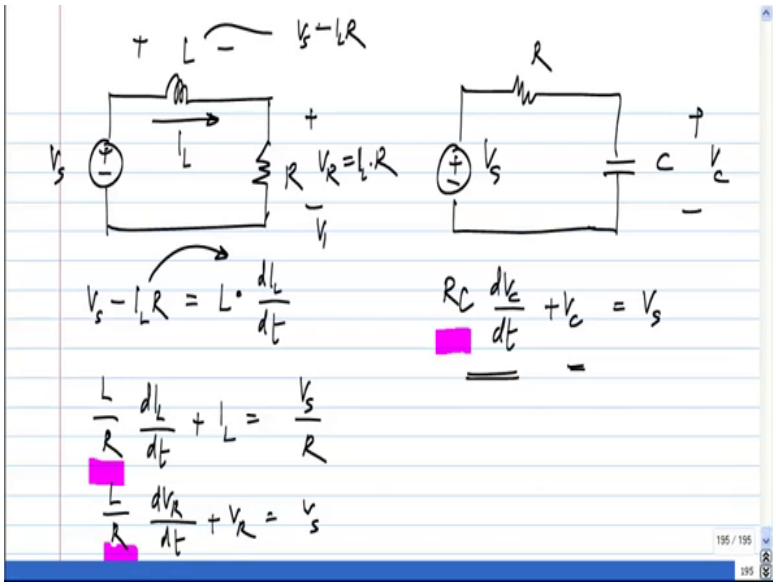

Inductors - they work in exactly the same way. So, I want spend many time or lot of time of this. Let me take the familiar one also. We know the differently equation for this V c here, and here I will write for I L; just for ((Refer Time: 00:33)) I could write for this voltage also V r as well. So, this one we know I going to write it right away, this is the voltage across the capacitor, this is the voltage across the resistor, the total equals V s. Now in this, case what we have V s minus I L R which is the voltage across the inductor is L times dI L by dt. So, if I re arrange this, I get L by R time derivative of IL plus IL equals, if I write it as in term of V r, there is nothing special about it; V r in this particular cases, I L times R. So, I will get L by R I get something like that. So, I just associated in terms of explain this, this is the time constant, so that is times constant L by R. And everything else is exactly as same as in this case.

Now the inductor is sort of the counterpart of the capacitor with voltages and currents interchange. So, you cannot have discontinuity in inductor currents, if you have finite voltages, but clearly if you apply current source directly to an inductor, you will have discontinuities. So, similarly you have to look for nodes where you have only inductors

and current source. In that case if you have a step in the current source, there has to be step in the inductor current also. There is no other way C L will be satisfied. So just like loops of capacitor and voltage sources, you have to look for nodes with only inductors and our current sources, so that will give you possible discontinuities in inductor currents; otherwise there will be no discontinuities in inductor currents and you evaluate everything the way you did before.