Basic Electrical Circuits
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Lecture - 23
Current Controlled Voltage Source

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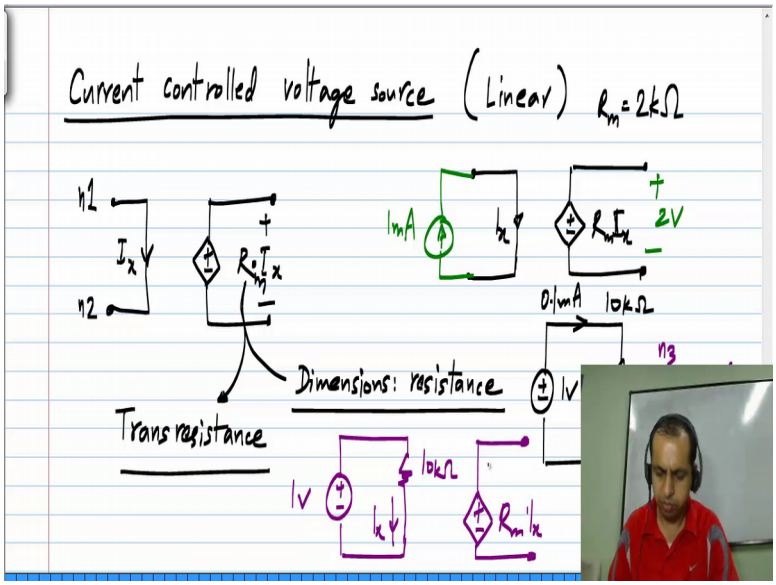

The next controlled source we look at is a current controlled voltage source. It has a controlled voltage source, whose values is given by current flowing l square its common to think of a wire in which a current is flowing, basically there is a short circuit between these nodes n 1 and n 2. And this can be placed in series with any branch to sends the current in that branch those things we will see later, when we come to circuits in which this current control voltage source is used. So, let say this current is I x then the voltage across these two terminals is given by R times I x, this proportionality constant let me denotes this by R m, this proportionality constant is many times call the trans resistance; obviously, this has dimensions of resistance, because it multiplies a current to result in a voltage and it is called the trans resistance of the current controlled voltage source.

Again the relationship R m times I x tells you that it is linear. So, I would not go through that, this is indeed linear. And what does this mean, it means that let say, we have a controlled source defined like this with R m being let say 2 kilo ohms so that means that if you connected a 1 milliamp source like this, you would measure 2 volts across these terminals. Now the input branch which is really short circuit can be placed anywhere in

the circuit to sense the current. For instance, let say we have a circuit like this a 1 volt source connected to a 10 kilo ohm resistor, we know that 0.1 milliamp will flow through this by ohms law.

Now, let say I do this and break this here, and connect it to a current controlled voltage source. The same one let say with R m equals 2 kilo ohms, this is I x, and this is R m I x, what does this mean across this I will measure 2 kilo ohm times 0.1 milliamp which is 0.2 volts, so that is the meaning of this. And typically you do not show this breaking of the connection and inserting it like this and so on. The way of this circuit will be normally shown is simply as follows. We had this 1 volt and 10 kilo ohms, this could be any circuit anywhere. Now the input wire or the input branch of the current controlled current source is placed in series with the resistor to sense its current. So, what is normally done is to simply label this as the current I x, and have a voltage source V x which is defined as I have a voltage source which is defined to be R m times I x. So, this is how it is usually denoted.