Basic Electrical Circuits
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Lecture – 22
Voltage Controlled Current Source (VCCS)

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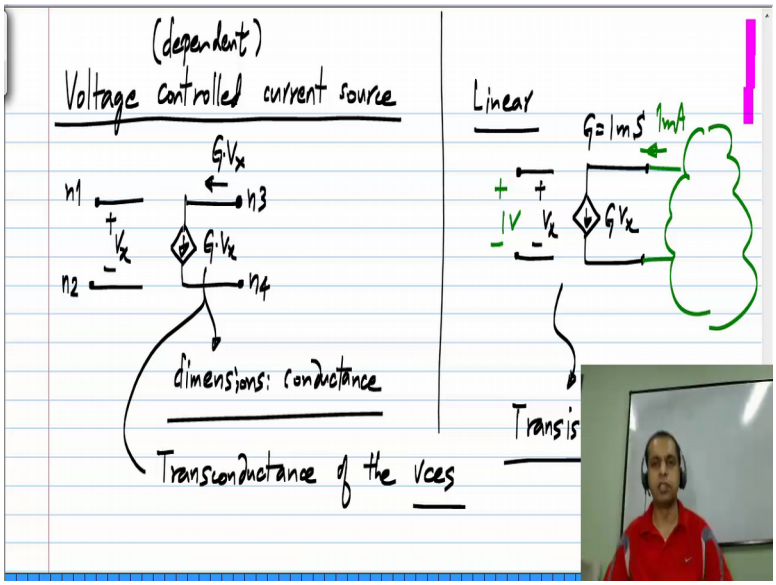

Next we have look at another controlled source which is the voltage controlled current source, and this is given by a symbol which is similar to a current source. But again we use a diamond instead of a circle to distinguish independent sources from controlled sources. And also we have to have controlling nodes or this says as if the voltage between let us say n 1 and n 2 is the V x that will cause a current some G times V x to flow from n 3 to n 4. So, now this G obviously has dimensions of conductance, because it multiplies a voltage and results in a current, it has dimensions of conductance. Sometimes this is called the trans conductance of the voltage controlled current source, it is common to abbreviate voltage control current source as VCCS, similarly for all the other controlled sources. So, again because this current is g times V x, which is a linear function of V x, this controlled source is linear. As I said all the controlled sources we consider will be linear.

Now, what is this mean again, let say we had a voltage controlled current source, which I given by G equals 1 milli Siemens; it means that if I apply 1 volt on this side, and let say the other side is connected to some circuit, it causes a current of 1 milli amp to flow over there. Now as I mentioned while discussing independent current sources, just drawing current source like this with open circuited nodes is not legitimate, because it violates Kirchhoff's current law, but it is cumbersome to keep connecting some arbitrary circuit, we have to imagine that if this is connected to some circuit, it causes a flow of a certain amount of current given by the value of the either the independent current source or the controlled current source. And sometimes this controlled current source is also known a dependent source, because the value of the controlled source whether it is voltage of current depends on some other variable in the circuit. Again this voltage controlled current source does not correspond to a physical element like a register, but it is some model for something or it turns out that a voltage controlled current source is a good model for many active devices such as the transistor. We would not be discussing that here, but later when you come to transistors, you will see that the behavior of the transistor, and the certain conditions is well modeled by a voltage controlled current source.