Basic Electrical Circuits
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Lecture – 12
Compensation Theorem; Two ports

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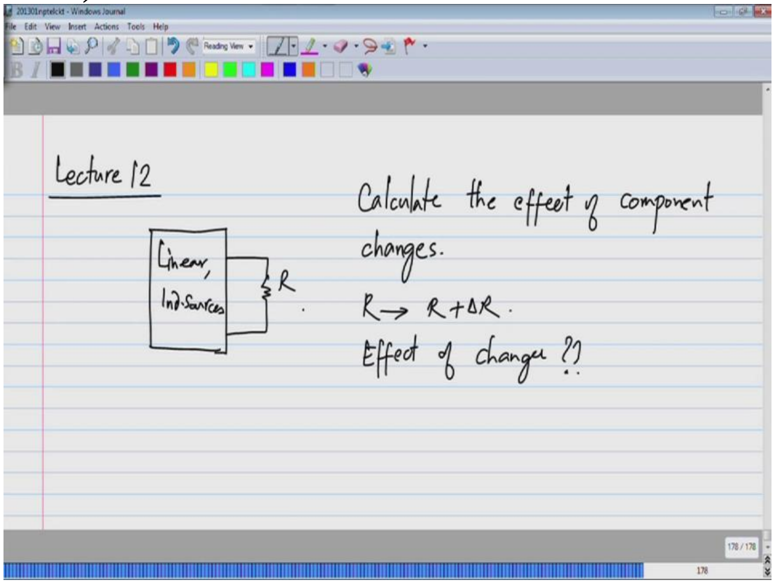

In the previous lecture, we looked at reciprocity of resistance networks, which is very important property of resistance network. And it also quite useful, because when you interchange the stimulus and response there is we have a two port network, and you apply stimulus on the lecture measure the response on the right side. And then you apply the stimulus on right to measure the response on the left, the ratio will be the same, let's effective the what reciprocity is. Any questions regarding what we did until the previous class?

So now where we looked at couple of more circuit theorems, and then move on to two port representations. One of the ah interesting things is and practical thing to that we need to calculate many times is that we have some components, let's say resistor. It could be voltage source or current source also. And let's say this is the this is one network ok, which has let's say it's linear network with some independent sources. So many times, what we need to do, is to calculate the effect of component changes. So resistor is R changes to R plus delta R. So the question is how can we calculate all the ah new ah solution to the circuit, that is new branch voltage, new branch currents.

Now one possibility of course, is the recalculate everything that is new value of the component, we redo this circuit analysis. So the whole point is try to do it in a way easier than that. Now again ah as usual we expand linearity to help us calculate this, without going to the whole circuit analysis again, that's the idea, that is with new value of the component, because this is the new circuit and we could repeat the circuit analysis.

Now we are try node to do that and try to ah try to calculate the effect of changes without ah having to go through the circuit analysis again. Now instead of resistance, it could be a voltage source or a current source also; in that case, it is easier and with resistance, it's slightly more complicated.

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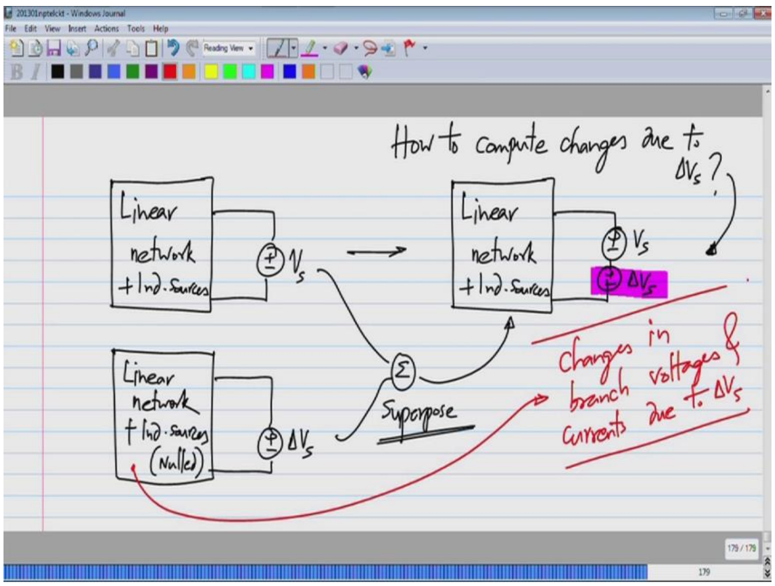

So let us say a linear network with independent sources, now let me take a voltage source V s, (( )) I change only this ah voltage source value to V s plus delta V s. So in general all the branch voltages and current sensors, this will change. So is there any easy way of computing only the changes without the reading the circuit analysis, let's try to think about it. Is there a way of calculating only the change due to the change in the voltage source. How we go to doing this, please try to answer this. So let us (( )) answer, you use superposition and the way to do it is because of this linear network, now we already calculated the solution to this, and V s plus delta V s is nothing but V s, in series with delta V s. So now in this particular case, when you originally calculated, everything is active except this one. You can think about it this case with delta V s is equal to 0, what we have to do is to take the null circuit, this is nulled and V s also nulled and only delta V s active on the network. So now if you superpose these two, it would take sum of the these two solutions, you will end up with the solution to last one. But so now ah the point is that analyzing the circuit with only delta V s is simpler than ah reanalyzing the whole circuit. In fact, if you look at branch voltages and current in this, it will be (( )) effective delta V s that is needed changes to the branch voltages and currents due to delta V s.

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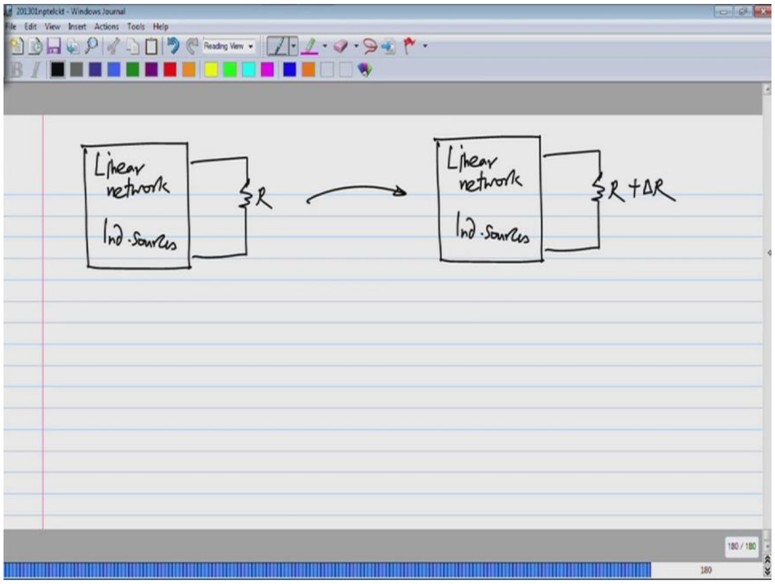

Now ah let us say instead of voltage source, resistor- R, a linear network plus independent sources here and then I change this one resistance to R plus delta R.