Basic Electrical Circuits
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Lecture - 91
Degenerate Cases

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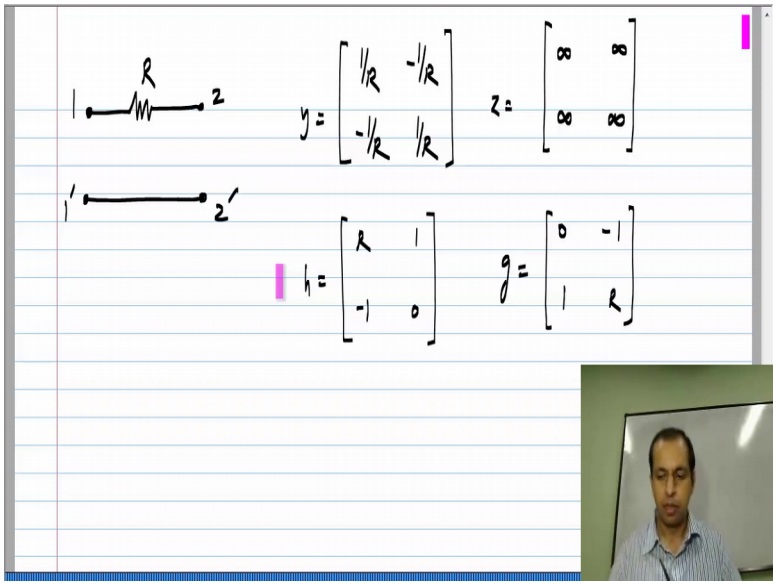

In this lesson, we look at the some simple network with extreme values of parameters. This is just to illustrate to you that you can have some set of parameters well defined and others not a defined. So, let us take a very, very simple circuit, just this, this is the two ports and contains a single resistance. Now please go ahead and calculate all four parameters sets for this that is y parameters, z parameters, g and h parameters. Now we will find that y parameters set for this will be 1 by R minus 1 by R minus 1 by R and 1 by R. The h parameters are R 1 minus 1 and 0. The G parameters are 0 minus 1 1 and R, but if you do try to calculate the z parameters, all of them come out to be infinite.

So, now, you can also see that this y matrix, this has to rows, which are dependent. The second row is simply negative of the first row. So you know that this cannot be inverted, this is one were to think about it. Otherwise if that if you do apply a current here with the other port open circuited, we will only get infinite voltages, because there is no path for the current to flow. So for this particular circuit, we have y, h and g parameters which are well defined, but z parameters, you cannot defined that. This is something like trying to measure the resistance of an open circuit, it will come out to infinity.

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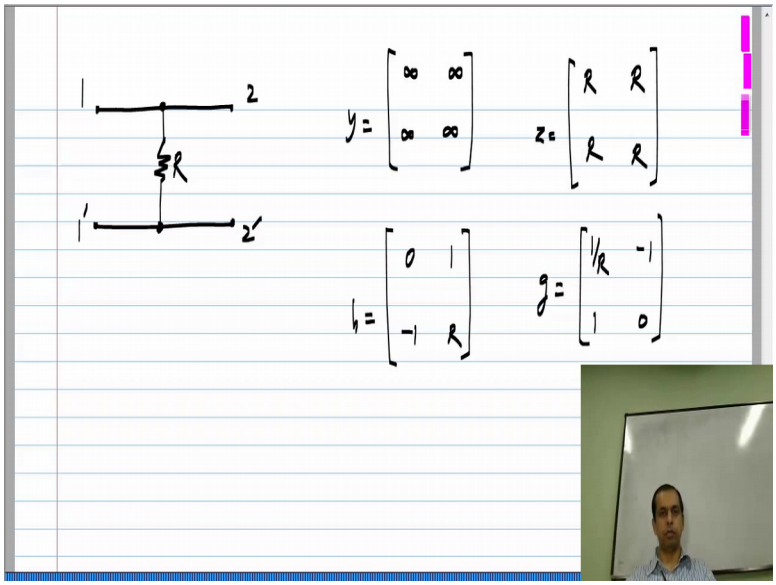

We can take another simple circuit. In this case, I have the resistance connected in parallel between 1 1 prime or 2 3 prime and 1 1 prime and 2 2 prime are the same terminals, but that does not matter. I can defined the two port and anywhere I want. In this case, you will find that the z parameters will be R R R and R. The h parameters will be 0 1 minus 1 and R. And the g parameters will be 1 by R minus 1 1 and 0. But if you do try to calculate the y parameters, they turn out to be all infinite. You should have guess this, because the z parameters matrix the two rows are identical. So, this cannot be inverted, you will get infinities. Also if you short circuit this port, you have infinite conductance looking in from port one, so that also tells you that these parameters will be infinitely. So, this is an example where z, h and g parameters are well defined, but y parameters are not.

There are number of other such an example, where some parameters are defined and some others are not. Now some of these are given in that activity questions. So, one of the important sub cases are control sources. Control sources are two port networks. So, you have input applied to one side and the output coming out from the other side. So, for these, it will turn out that some parameters sets will be undefined. So, these are dealt with in the activity question for this lesson; please go through each of them and think about them carefully.