Basic Electrical Circuits
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Lecture - 88
G Parameters- Examples

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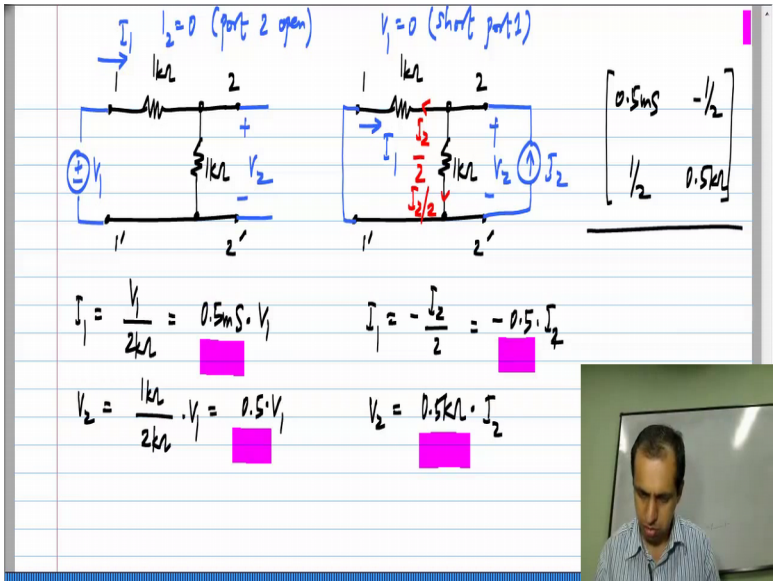

Now I will work out g parameter for a couple of example circuits. So, this is my two port, and to measure g parameters, I need two conditions with some independent source set to zero. Now as usual, I would encourage you do work out the parameters yourselves, and compare it to the answer I give rather than simply looking at what I do. So, in one case, I open circuit port 2; and in the other case, I short circuit port 1. And in the first case, the apply voltage V 1 and measure I 1, and also V 2. Now it is clear that this series combination of two 1 kilo ohm resistors is across V 1. So, I 1 is V 1 divided by 2 kilo ohms, which equals 0.5 milli Siemens times V 1; similarly, V 2 it is the result of voltage division between these two resistors. So, we get 1 kilo ohm by 2 kilo ohms times V 1 or simply half of V 1.

So, you see that this is the g 1 1, this is g 2 1. And similarly for the other two parameters I apply a current I 2 to port 2, and measure V 2 and I 1. Now this current I 2 divides into two equal parts, because the two resistor are equal, and we will have a current I 2 by two that way, and I 2 by 2 through this resistor. This I 1 is the same as the current through this resistor, but in the opposite direction. So, I 1 is minus I 2 by 2 or minus 0.5 times I 1.

And finally, the parallel combination of these two 1 kilo ohm resistors appears across I 2. So, V 2 is the parallel combination of two 1 kilo ohm resistors, which is half kilo ohm times I 2. So, this is g 1 2, and this is g 2 2. So, the g parameters matrix for this particular circuit is half a milli Siemens, half, minus half and half a kilo ohms, quite simple.

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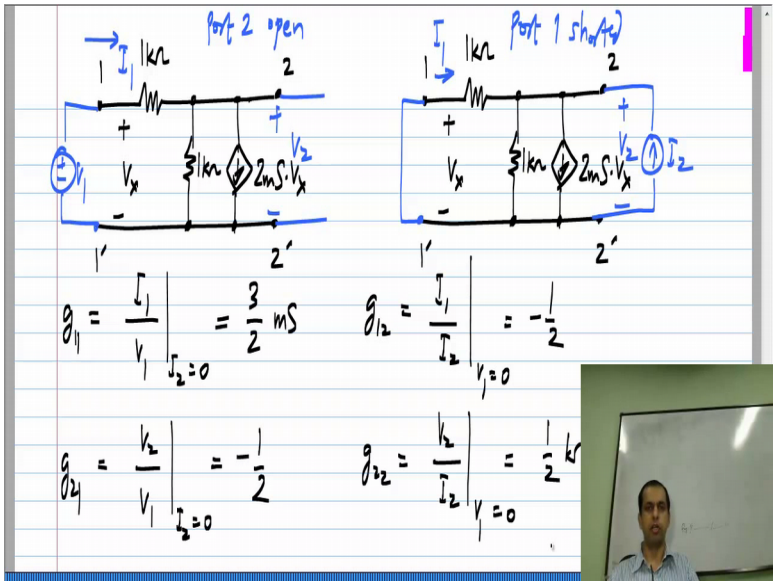

Now, let me take the other circuit I have been taking all around with the control source. So, I have 1 kilo ohm, 1 kilo ohm, and 2 milli Siemens times V x, where V x is here that control source; this is my port 1 and port 2. So, as usual, I have two port conditions for the two port parameters measurements. In one case a open circuit port 2 and apply V 1 and measure V 2 and I 1; in the other case, I have port 1 shorted, I apply I 2, my measure V 2 and I 1. And from these, I will get all four parameters g 1 1 I get from these it is I 1 by V 1 with I 2 equal to zero; g 2 1 also we get from this which is V 2 by V 1 with I 2 equal to zero. Similarly g 1 2, I get from the second setup which is I 1 by I 2 with port one shorted, and similarly g 2 2 is V 2 by I 2 with port one shorted. I would not show the working out of these parameters in the detail, please pause the video at this point and evaluate all of these things and compare it to the answers that I will give. So, for this circuit, this turns out to be 3 by 2 milli Siemens. And this is minus half, minus half and half or kilo ohm. So, these are the g parameters of this circuit, please calculate this by yourself as I said from scratch and also verified that this is the inverse of the h matrix you calculated earlier.