Basic Electrical Circuits
Dr Nagendra Krishnapura
Department of Electrical Engineering
Indian Institute of Technology Madras

Lecture – 87

Now, I will consider the last set of two port parameters, which are known as g parameters or inverse hybrid parameters. In case of hybrid or H parameters, we took I 1 and V 2 as independent variables, now in this case we will take V 1 and I 2 as independent variables. Otherwise, the rest of the step is similar to H parameters and also to z and y, in that you set one of the parameters to zero fourth the measurements and so on.

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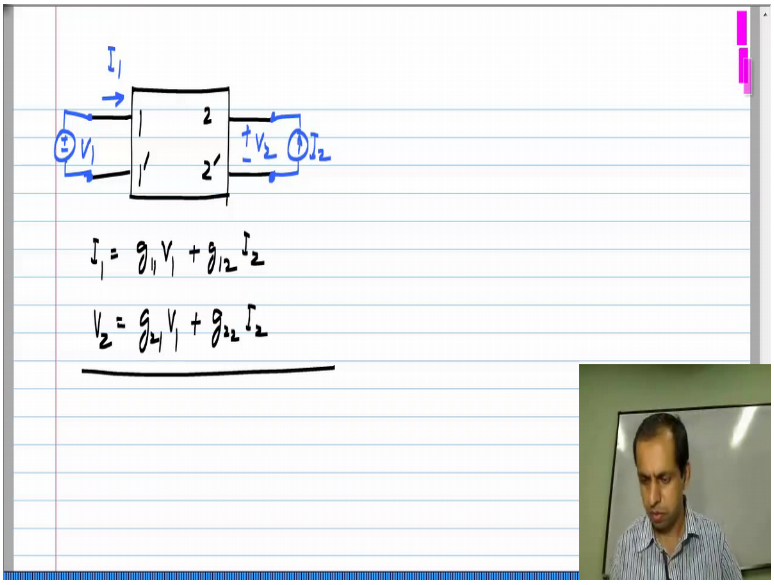

So, we apply V 1 and I 2 and measure I 1 and V 2, as you except both I 1 and V 2 are linear combination of the applied independent sources, which are V 1 and I 2. Now, to measure this, again we do 4 measurements with independent some independent source set to 0 each time.

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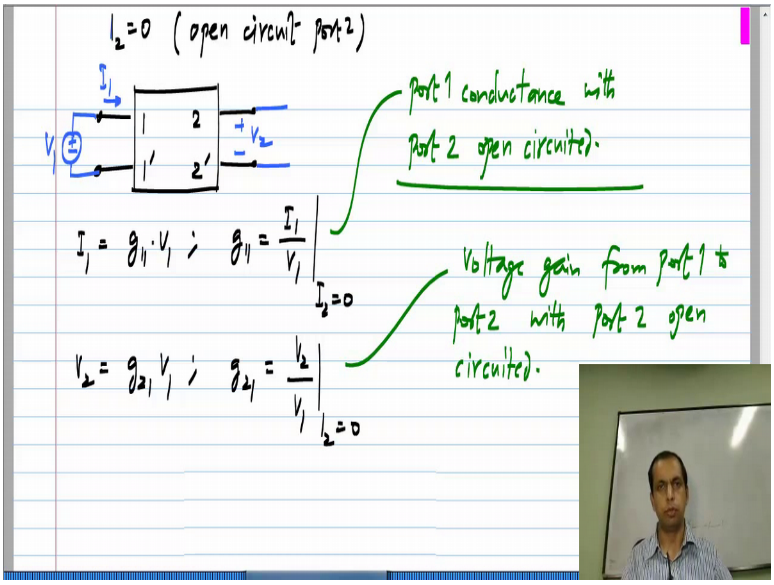

First we set I 2 to 0; which means, that we open circuit port 2 and apply a voltage V 1 to port 1 and then, we measure I 1 and V 2. So, I 1 will turn out to be g 1 1 times V 1, the contribution from I 2 is 0, because I 2 itself is 0. So, this tells you that g 1 1 is I 1 by V 1 with port 2 open circuited and you can see that g 1 1 is nothing but, the conductance looking in to port 1 with port 2 open circuited. Now, V 2 will be g 2 1 V 1, so g 2 1 will be nothing but, V 2 by V 1 with port 2 open circuited.

So, this g 2 1 is nothing but, the voltage gain from port 1 to port 2 with port 2 open circuited. So, very similar to whatever we had earlier and naturally, g 1 1 has dimensions of conductance and g 2 1 is dimensionless.

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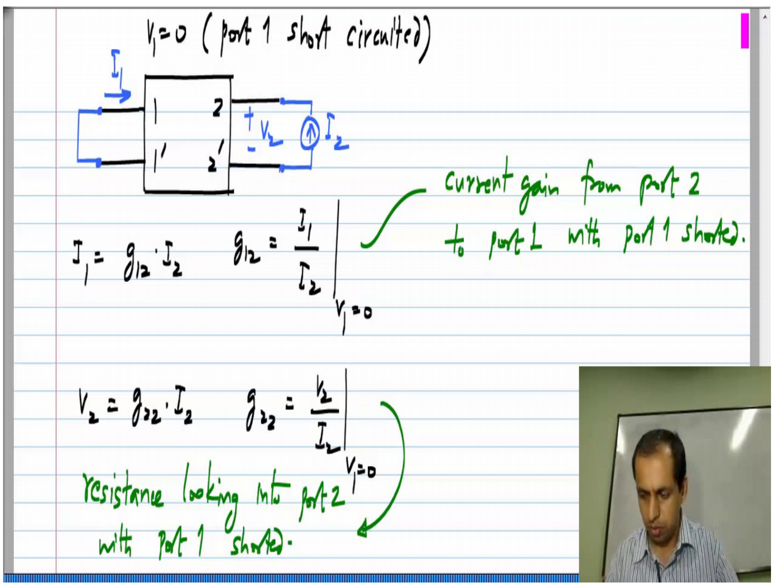

Now, for the other set of measurements, we set V 1 to 0, so that is port 1 short circuited and we apply a current I 2 to port 2, with that we measure I 1 and V 2. So, in this case I 1 will be g 1 2 times I 2 or g 1 2 is I 1 by I 2 with port 1 shorted. In other words, it is the current gain from port 2 to port 1 with port 1 shorted and V 2 is g 2 2 times I 2 or g 2 2 is V 2 by I 2 with V 1 equal to 0, which is nothing but, the resistance looking in to port 2 with port 1 shorted, so that is what g 2 2 is. So, very, very similar to all the other parameters, the measurement techniques are.

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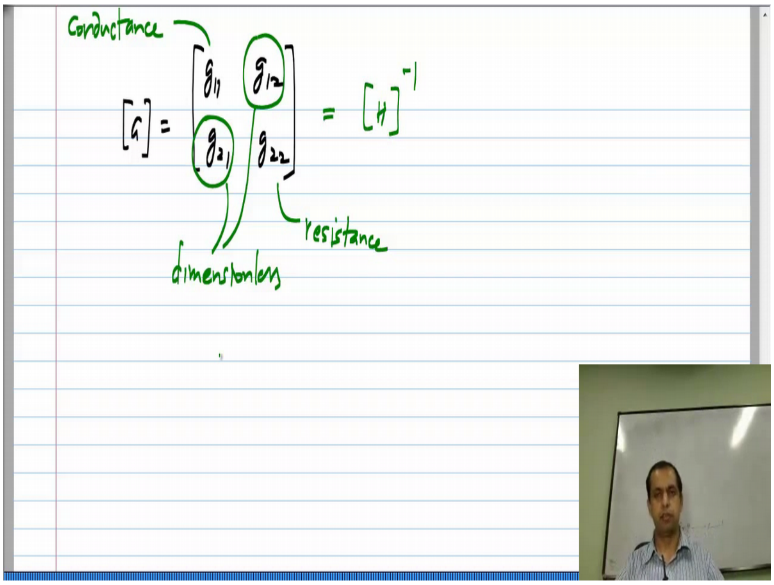

Now, the g parameter matrix is g 1 1, g 1 2, g 2 1, g 2 2, where these two are dimensionless and this one is a conductance and that one is a resistance. And from the definitions, it must be obvious that this is the inverse of the H parameter matrix, z and y are inverses of each other and g and H are inverses of each other.