Course name: EMI /EMC and Signal Integrity: Principles, Techniques and Applications.
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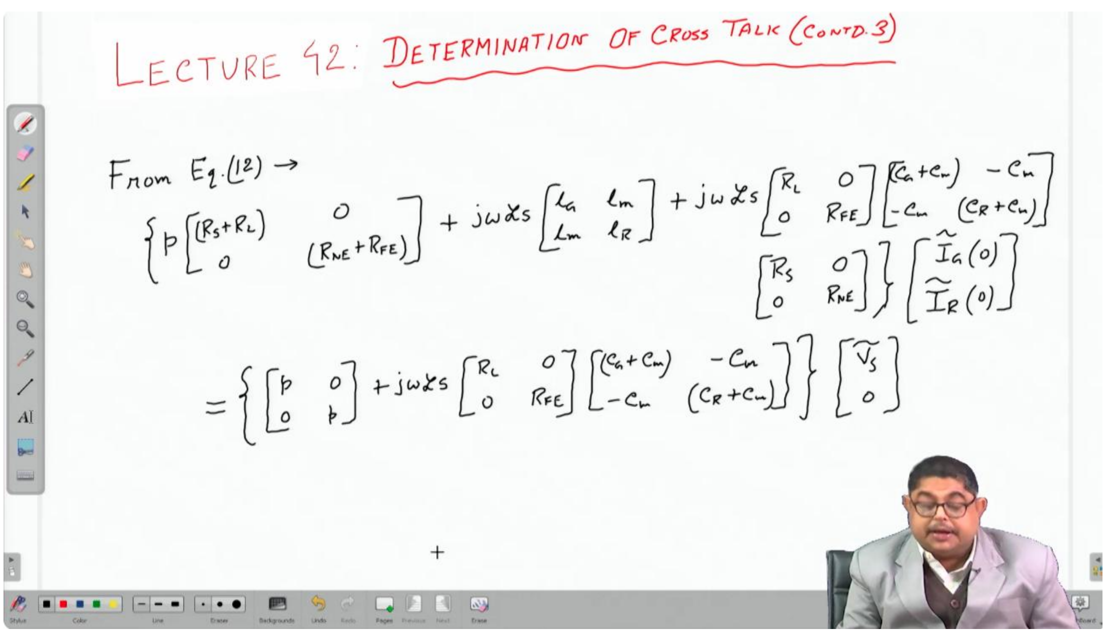
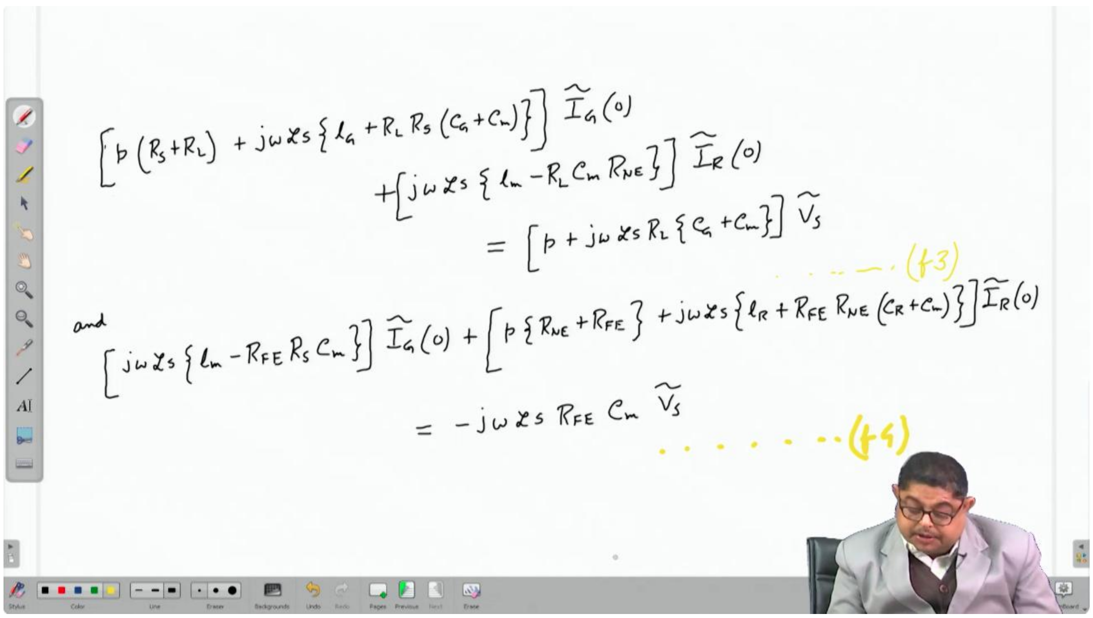
Week :09
Lecture 42: Determination of Crosstalk (continued)

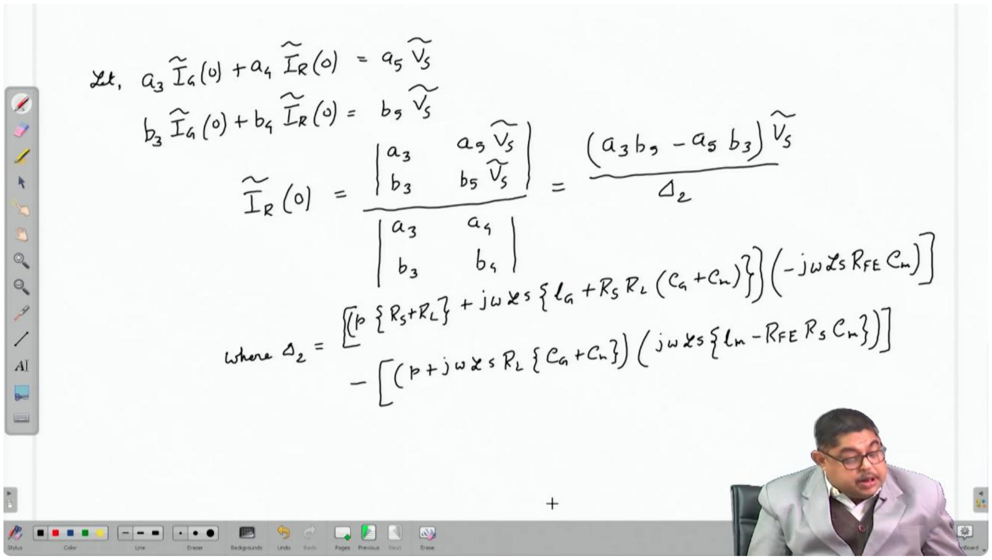
Welcome to the lecture of the course on EMIMC and Signal Integrity Principles, Techniques and Applications. In the last few classes, we were seeing how to determine crosstalk in frequency domain. So, in the last class, we have seen the crosstalk at the far end, today we will see the crosstalk at the near end. So, I start from equation 12. Just exactly similar to the far end case, so from equation 12, one can solve for IR 0 that means, IR that means, the current in the receptor circuit at the near end and from that we will get the VNE. So, if we look at equation 12, we can put the values of various matrices. So, that we will do now that P into R s plus R l 0 0. So, we have got the matrix L matrix L G, L M, L M, L R. Z l matrix then C matrix. Then Z s matrix. I matrix. P into I 2 that is this. Again Z l matrix. So, after putting the value in value of various matrices in equation 12, we give this. So, it is clear that this gives rise to two simultaneous equations in I G and I R.



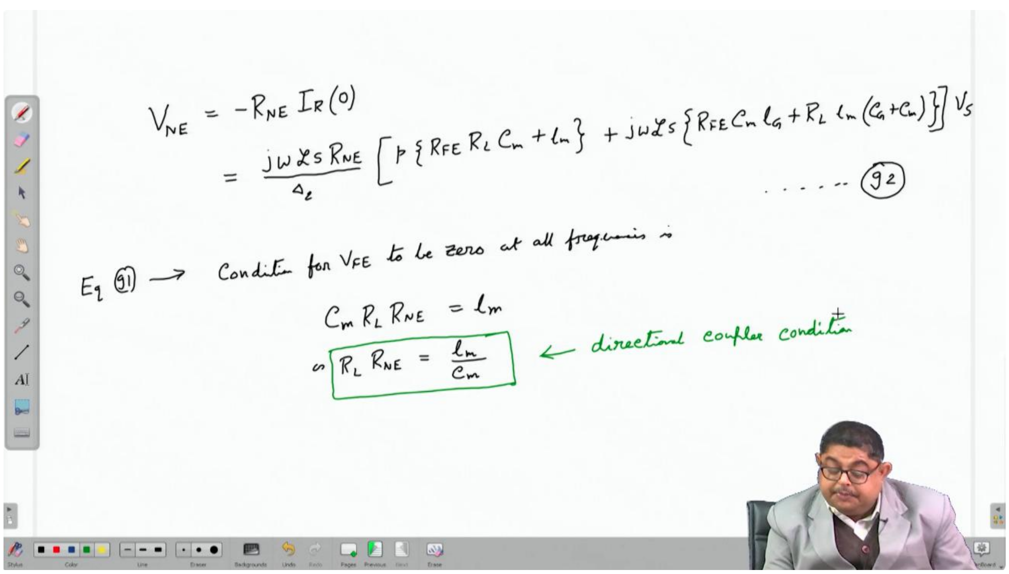
So, they are the first one is P R is I can put it here a first bracket that will be better. So, this is the second bracket. So, let me change this one to a third bracket. So, that this into I R. I G 0 plus j omega L s. I G 0 plus j omega L s. So, this equation let me call F 3. As per VFE you have seen we have got F 1, F 2. So, this one I am calling F 3 and j let me write and j omega L s L M minus a simple matrix manipulation. So, this is the second bracket. So, this is the second bracket. So, this is the second bracket. Let me call this equation F 4. So, this F 3, F 4 I can solve either for I G or I R. I G 0 or I R 0. Now, my interest is not in I G 0, my interest in I R 0 because that is concerning the receptor.

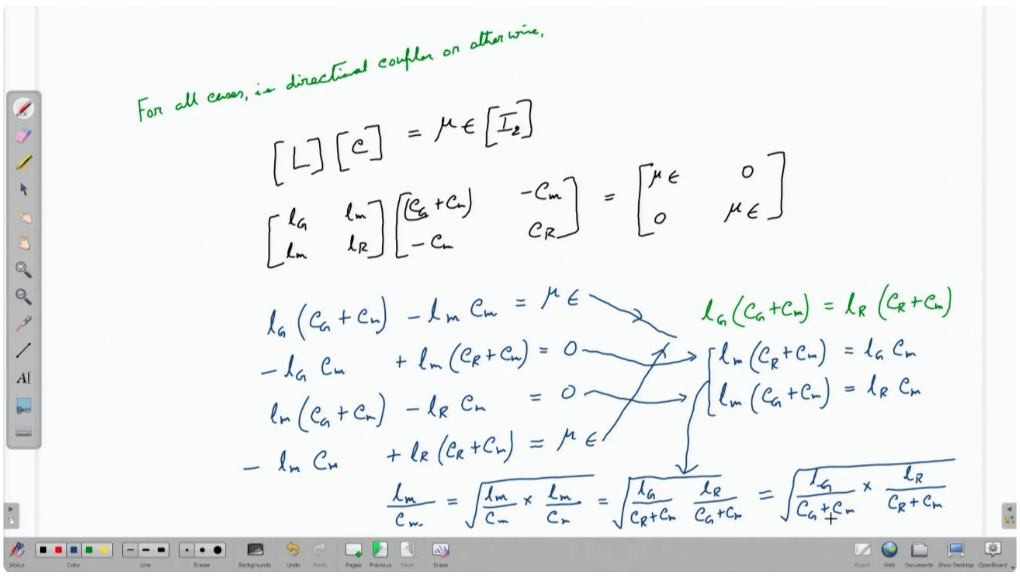


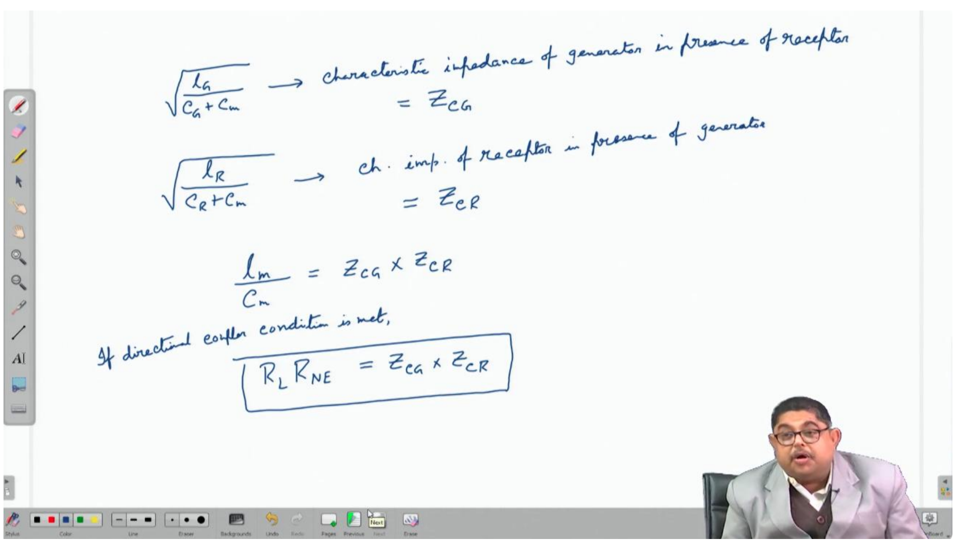
So, I will do that. So, if I write like this that let a 3, a 3 is a coefficient plus a 4 I R 0 is equal to b 5 V s and b 3 I G 0 plus b 4 I R 0 is equal to b 5 V s. So, from this I can solve for I R 0 that will be determinant a 3 b 3 a 5 V s b 5 V s divided by the determinant a 3 a 4 b 3 b 4. So, this equal to a 3 b 5 minus a 5 b 3 into V s by delta 2 where delta 2 is P R s plus R s plus R s. So, I get I R 0 plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s plus R s minus G omega e s R e p m minus P as G omega l a.



This is an important result L m by C m is equal to Z cg into Z cr. If directional if directional coupler condition is met already we have seen that for directional coupler L m by C m is equal to R l R ne. So, then we can say that R l R ne is equal to Z cg into Z cr ok. So, these results we will using later ah, but these are important results. So, how to design a directional coupler there is an indication here ok. So, we have seen the two expressions g 1 and g 2 for crosstalk. We will in the next class we will now make some practical assumptions and then find a compact form of those crosstalk expressions. Remember all these is in frequency domain because we are using phasor things.







So, that frequency domain crosstalk expressions the final equivalent circuit model all we will do in the next class. Thank you.