Lecture - 64
Nodal Analysis versus Mesh Analysis

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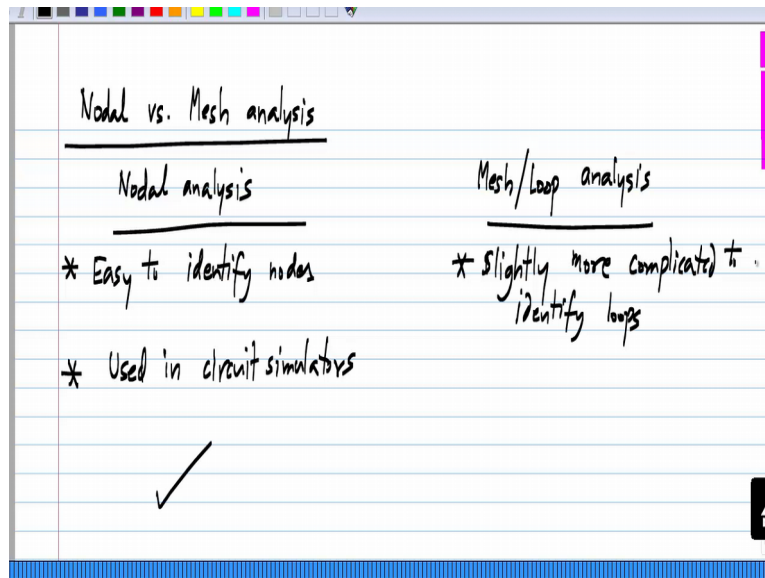
Now that we have studied both the mesh analysis and nodal analysis; we will briefly compare the two. So, when to use one versus the other that is the main question. And I did not consider the general loop analysis, I only took mesh analysis, which is loop analysis for the special case of planers circuits, but these comments apply to loop analysis as well. In general, my personal preference is for nodal analysis; this is because typically first of all it is very easy to identify nodes. So, you know that you have a circuit with n nodes and there all write there for you to see; whereas, it is a little more complicated to identify loops, which are independent. Now another thing to consider is which case gives you pure equations, and of course, you cannot make a general statement about this. You can have a bunch of nodes and you have a components connecting between every node and every other node then obviously there are lot fewer nodal equation then there are loop equations. But of course you do not have such an extreme case either; now the other extreme cases, you just have one component between these two pairs of nodes another component and so on. So, your n node circuit consist of only n components that is there is a single loop; obviously, in that case loop analysis brings out you have a single loop and same current flowing through every component in the loop.

Now all real circuits with lies somewhere in between, but by and large I think you will end of with pure equations with nodal analysis so that is why a nodal analysis is preferred as well, but the main reason is that it is lot easier to systematically identify the nodes and write down the equations. Now one case where especially for hand analysis, this mesh analysis may be more useful is that you visibly see that there are small number of loops, but each loops has a number of components in series. So, in that case, it is easier to do mesh analysis or loop analysis compared to nodal analysis, but by and large nodal analysis is what is normally used and it is also used in circuit stimulators. So, this is what is used most of the time, so that is just for comparison. Of course, for hand analysis of circuits, I suggest that you draw try both or at the very least when a circuit is given to you, you consider both nodal analysis and mesh analysis and see the implications on the number of equations you have to write. At least that way you will have a good idea of what is involved in caring out either of them. And after you get enough practice, you can just pick one and move on; anyway hand analysis is carried out only for small circuits.