Basic Electrical Circuits
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Lecture – 01

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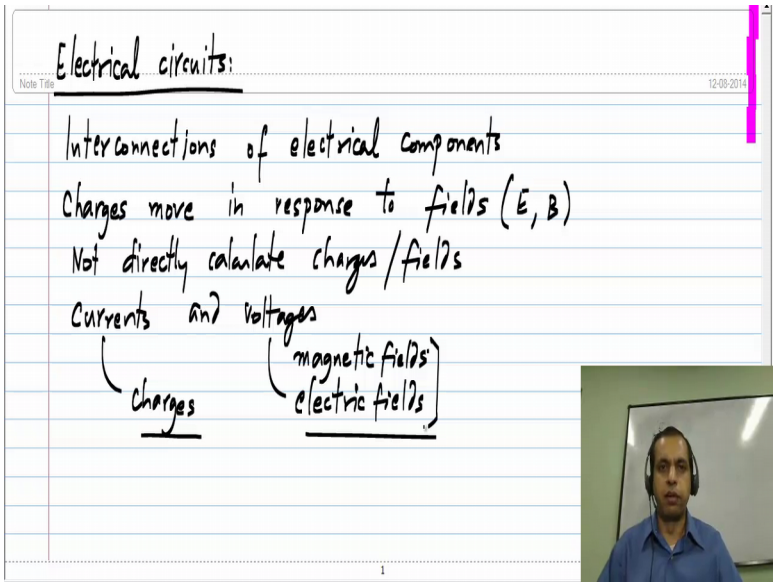

Hello and welcome to Basic Electrical Circuits. As the title says, this course is about circuits, so the first thing we will do is to learn what circuits are all about. I have just put down that electrical circuits are interconnections of electrical components. Now of course, that does not explain too much we will get into more details of that, but what happens in electrical circuits is that there are currents and voltages which are basically some other representations of charges and fields. So what happens in electrical circuits is that charges move in certain ways and they move in interesting ways that carry out certain useful functions.

So, unlike a mechanical gadgets in an electrical circuit you do not say any moving parts; all the actions happens inside the wires and inside the components in the forms of charges moving and fields taking on some values and somewhere and so on. So there necessarily more abstract than mechanical gadgets; so for that reason, we have to learn to deal with abstract quantities such as charge and field and voltage and current and so on. By abstract I do not meant that their unreal, what I mean is you cannot see or perceive them directly; whereas, in a mechanical gadget you can see the object moving.

Now, all of you will know some basics of electromagnetic you know that basically the electromagnetic fields are governed by Maxwell's equations. The four equations given to us by Maxwell describe the interrelationships between electric field, magnetic field and charge distribution. Now, you also probably have the experience that doing any calculations with charges and fields is immensely complicated. Now we certainly cannot afford to do that for a very complex circuit. So it turns out that we will not directly deal with charges and fields, but some other equivalent representations which effectively mean charges and fields, but we would not directly deal with charges and field, but we will deal with currents and voltages alternative representations of charges and fields.

So, what happens in an electrical circuit is that charges move in response to fields which could be either an electric field or a magnetic field, but like I said we will not directly calculate charges or fields. Now what we will do is deal with currents and voltages which effectively represent charges and electric fields in some way. This could also be related to the magnetic fields as well, so we will deal with currents and voltages. Now, usually what happens is you are given charge distribution basically the spatial distribution of charge and from that you have to calculate the fields elsewhere, and this usually involves a lot of complicated algebra. Now it turns out that under certain circumstances, you can ignore the spatial distribution of anything that is as we will go further we will see that we will not worry about spatial extend of any component, we will deal with only the terminal characteristics.