Fundamentals of Power Electronics
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Lecture - 90
Intro for close loop control

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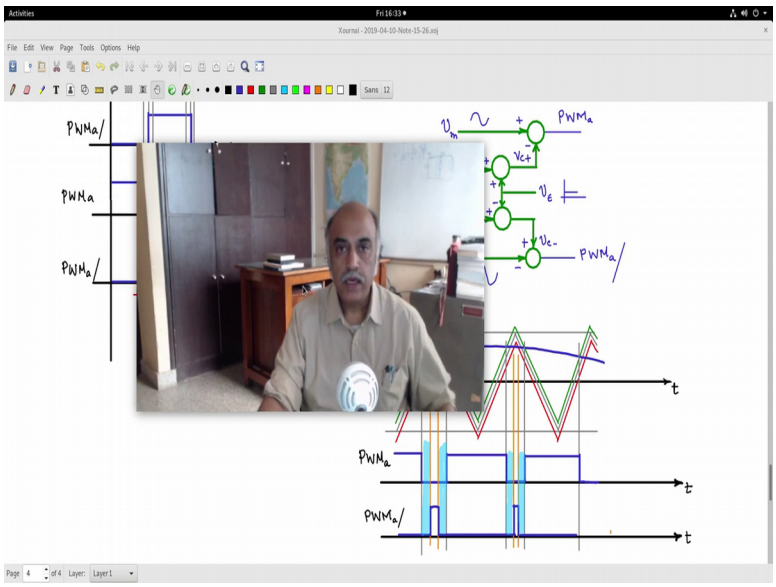

In this week's session, I will discuss about one of the more important aspects of DC-DC power converters and that is close looping. You see we have studied the non isolated DC-DC converters, the park the buck boost, the boost converters they are called as the primary DC-DC converters. We have studied the open loop operation, the steady state operation and we have seen how to design that. We have also seen isolated converters like the forward converters, the various forms of the forward converters and then the derived forward converters like the push pull, the half bridge and the full bridge. And, also the buck boost derived converters like the fly back these were the, these were some of the isolated converters that we discussed and also studied how to design.

And we also looked at the magnetics how to design a magnetics L and the transformers. So, having done all that we know how to operate the DC-DC converters in the open loop. Now, the important part is that we need to regulate the output voltage or the inductor current or some state parameter within the converter. So, let us say that we want to regulate the output voltage then you have to feedback the output voltage and then take

some corrective action. So, a controller has to be built. A pi controller is the one of the most robust and industry standard converters we will discuss them.

So, we will discuss two aspects in controls, one is we will look at the traditional close looping and then I will introduce a slightly a modified form of the traditional control loop that is introducing feed forward control. It is a slightly faster form of the traditional control here also we will use pi control, but the stress on the pi controllers will be much lower. And then after that I will follow it up with another very important popular control mechanism especially for DC-DC convertors and that is current control or current programmed control.

So, current control is an important aspect of most DC-DC converter operation, used in many applications like battery charging and we will discuss a battery charging example with the current control. Of course, we will also look at simulation, NG spice simulation of these close looping aspects close looping with a normal close looping, close looping with feed forward control and then close looping with current control. Then after that I would like to close the session with an introduction to single phase inverters. Single phase inverters which are driven by sinusoidal PWM control patterns strategy.

So, the switches I will take a full bridge converter as a typical topology example you have four switches q 1 q 2 q 3 q 4 the drive signals for q 1 q 2 q 3 q 4 will be so, generated such that the fundamental component in the PWM will be a sinusoidal waveform. And how do we generate such a PWM, how do we give the signals to the four switches, and then in what way the fundamental PWM can be extracted from the central arm of the bridge are aspects that I will be discussing.