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

Lecture – 138

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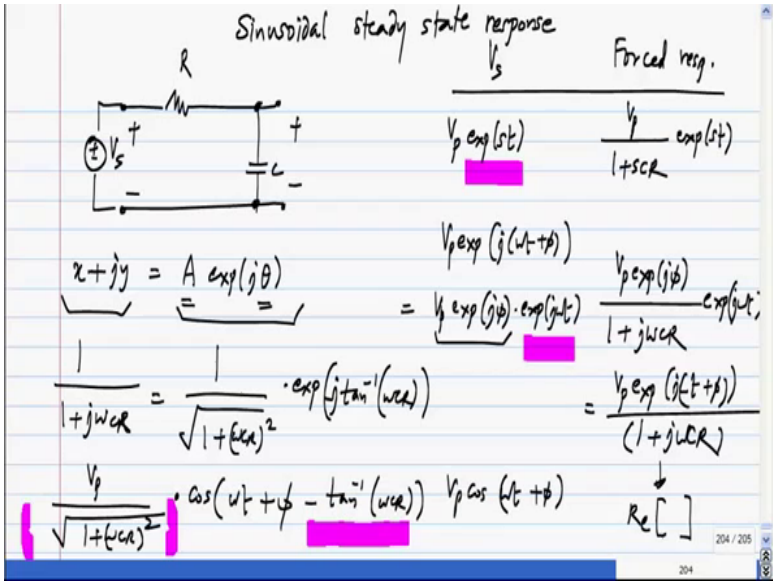

This response of linear system to sinusoid being a sinusoid of a same frequency let us said very convenient in many ways, first of all for analysis and later in some other course you will see that many signal can be decomposes some of sinusoids. So, this is not even although limiting, all the character is only with sinusoids you can find the response to any other input also it is a little more pain full in that in little more labor involve, but you can still do that and for also for testing.

So, what is testing after all when you want to test something let us say you have some standard input and you have a calculator output for the standard input it can be anything when you do the experiment, you applied the same standard input measure the output and see whether it matches with what you calculated, but texting we have something you expected and something you test to we see whether you get what you expected. Now, the problem is that if you use some other input then there can be other features in the system that can manipulate the signal, but yes.

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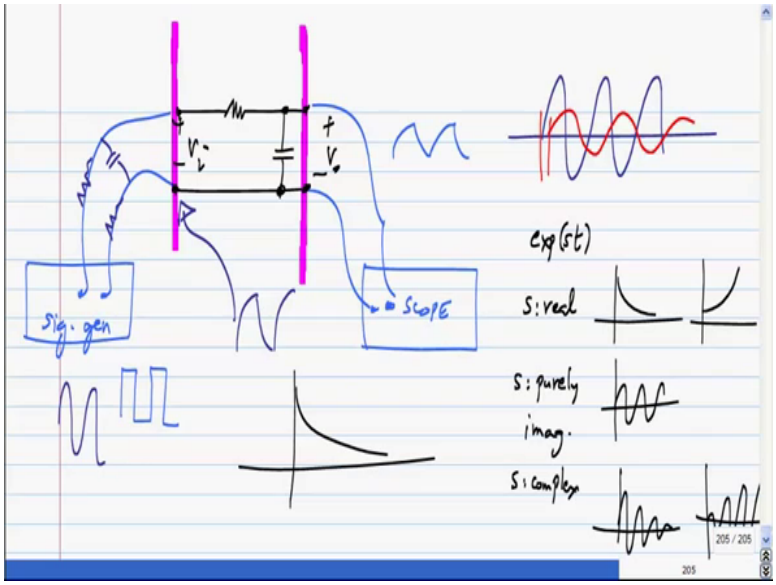

Let us say the circuit not to characterize, this is the input and this is the output and to do this I will apply some from a signal generator, some input together then I will take this to measure what comes out. Now, I can use any input for instance, I could ((Refer Time: 01:44)) using a square bracket again first of all surely calculated the response of the stage , but of course, it is slightly involved, but you can calculate it you can turn out to be something better some piece wise exponential statement. For, piece wise constant you will get piece wise exponentials.

Now, the many problems here first of all calculation is slightly more complicated you have of measure this precisely it see their getting what we are expecting and more importantly there will be others stuff here that will disturb the actual input made you have wires from here to here, very simple module for this yes it is a this self has some resistance and some capacitors.

So, what gets apply to the input is not even a square root that itself is some sort of exponential. So, you have to measure this very, very precisely calculate the output for that and then match the measured output to that one, so this whole thing is ((Refer Time: 02:43)). Now, if we have a sinusoids what happens, this also is a linear circuit. So, what you get here is also a sinusoid, it may not have the same amplitude as this one, but that is I want one more here I will acutely measure it may be a let set this 1.1 volt that is all.

So, I can just manipulate this I will get sinusoids here I will also get a sinusoids here and all I have to do this to measure it amplitude in face that also not very difficult to do. So,

let us say I have two channels of scope we can measure the amplitude in also let us a plot both simultaneously we can also measure the face by looking at this time difference.

So, now, because this exponential complicated exponential, so sinusoids are linear systems this is very easy. Now, I took this test circuit itself as R C circuit, but that is not necessary this could be anything I mean typically amplifier tested like this, it measure amplifier with sinusoids inputs and let us say it is only amplifier it have some range of into the slide 20 kilo volts you have sinusoids it different frequencies measure the response and see how ((Refer Time: 03:55)).

So, let me say amplifier data sheets they will give you the frequency response exponential that is exponential s t with real s we have exponential s t that is a general exponential you can have real s which means that you have they have wave forms like this, the s s negative or like that if s s positive and s s purely imaginary... So, sinusoids with the consent amplitude the s s complex and the real part is negative you get that in the real part is positive we get that.

So, now, I think your question is why it should not be uses real, what is the problem as doing at that, if you do that, that also satisfy property I mean it goes to a linear system and then ((Refer Time: 05:09)) exponential what is the issues, there any issue. The problem as that it is not a persistent input that is it is of course, true that to the response to an exponential in the exponential, but you apply an input and then after sometime ((Refer Time: 05:29)).

So, that could be slightly longer or shorter, but it will eventually d k, whether sinusoids is a persistence inputs. So, it is a lot easier to use the sinusoidal and also we are measuring the study state response. So, what it means is that the sinusoids study state response you apply a sinusoids, it is not the immediately you get a sinusoids as the output at the beginning it will have the exponentials also which are part of the natural response of the system.

But, for any stable system a natural response parts with die out and the force response will stay. Now, for an exponential input what happens is the natural response will die out, but the force responsible also dies out simply because of the nature of the input, whereas for the sinusoids the natural response of course dies out, but the force response part is persistence.

So, the response to sinusoids let us say your time constant is one micro second. So, you

apply sinusoids may be the national response last few micro seconds. So, you look the output after let us a 100 micro seconds could be say, the natural response not will have only the force response very easy, so that is why sinusoidal inputs not exponentials.