Computational Electromagnetics and Applications
Professor Krish Sankaram
Indian Institute of Technology, Bombay
Lab Tour 1
Introducing some electromagnetic devices

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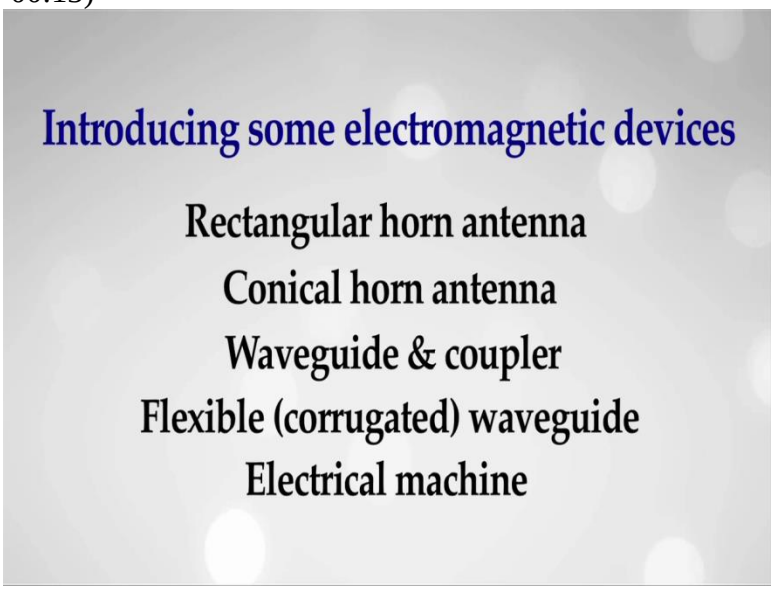

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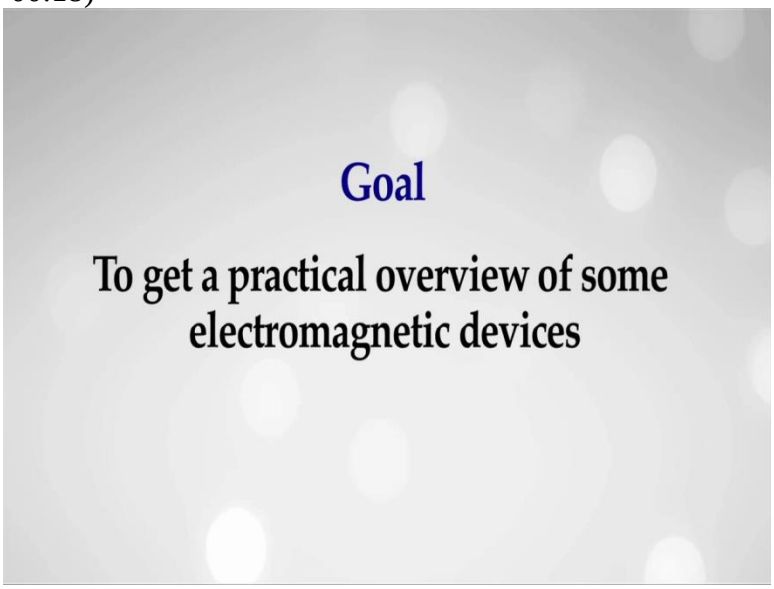

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"Professor - student conversation starts"

So Hemant could you please explain about this particular device.

Student: Yes, This is a Rectangular Horn Antenna and main part of this horn antenna is this waveguide this is a rectangular waveguide have a dimensions 40mm by 120 mm.

Professor: Ok!

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Student: And the length of this waveguide is 110 mm and this is fit using a coaxial connector.

Professor: So this part is the coaxial connector. Ok!

Student: This is the coaxial connector, and we can see inside this, we have fit (()) of throat

Professor: Yeah!

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Student: This one, in this throat this (()) length of around lambda by 4, so it is working as a lambda by 4 monopole antenna. And the aperture part is this, and the length of this aperture as you can say as a width, the height and dimension of aperture is around 450mm.

Professor: Ok!

Student: And the narrower aperture dimension is 320 mm

Professor: Ok!

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Student: And the length of this (())(01:35) is 250 mm

Professor: Ok, and the length of this wave guard is 110 mm Ok

Student: So the total length of this antenna is 360 mm

Professor: ok, this is mainly used as a reference antenna for

Student: This is mainly used as a reference antenna for GSM and CDMA band

Professor: Ok

Student: So to measure the radiation pattern and the gain of any other antenna you can use this as a reference

“Professor - studentconversationends”.

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"Professor - student conversation starts"

Professor: So Rinkie could you please explain us about this device

Student: Yes, this device is Conical Horn Antenna.

Professor: OK

Student:So in this device basically we are feeding with the help of circular wave guide

Professor: Okay.

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Student:So this one is the part of circular wave guide. And here the feeding purpose we are using circular antenna. You can see here in the last device there was monopole antenna and with the help of which we are feeding. But in this case with the help of Circular Antenna we are feeding. So this antenna is designed to operate from 2.1 Giga hertz to 2.2 Giga hertz. So the bandwidth that this antenna is providing is 100 Mega Hertz.

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Professor: Ok so could you please tell us also about the dimension of this circular wave guide?

Student: Yeah! So the dimension of this section is 11 centimeter and we want it 11(())(02:53). So for this purpose we have provided the reared angle and the outer dimension is 19 centimeter.\

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Professor: Ok and the main application of this kind of Antennas are

Student: So this antenna can be used for PG standard PG applications

Professor: Ok and also simulated and experimentally evaluated this kind of antennas

Student: Yes we have simulated as well as we have measured so we are able to get the results of the simulated terms.

Professor: Excellent! Thanks a lot! “Professor - studentconversationends”.

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“Professor - student conversation starts”

Professor: So Mahima, could you please explain this device what i have.

Student: So this is a wave guide this is a expand wave guide, this particular termination which we have here.

Professor: So it is a termination because the other side is shorted here. And what are the dimensions of this wave guide?

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Student: So this is the for expands this is about 22 mm by 10 mm. This is the WR 90 standard wave guide.

Professor: Ok what is the main application of this one?

Student: Sir this is like a cavity resonator if you short the other end and this length decides at what frequencyyou can resonate?

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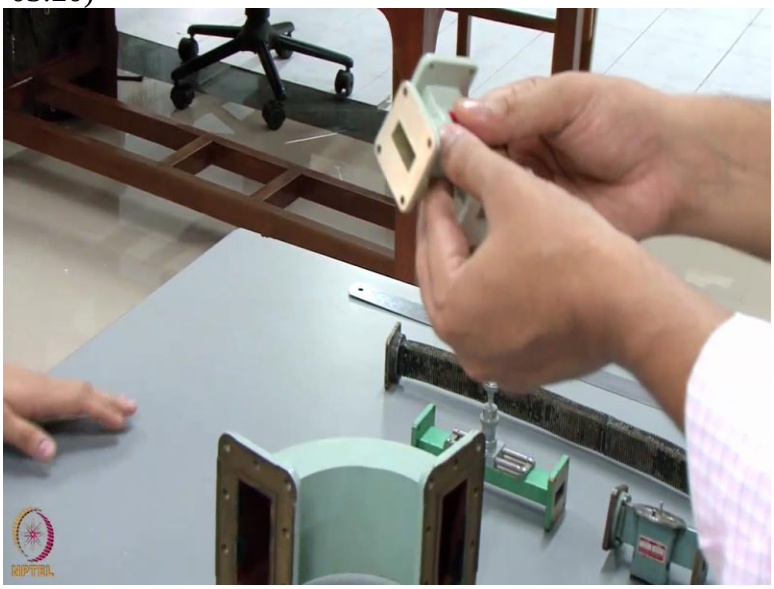

Professor: Ok and this one is?

Student: This is also for the same band, this is a power divider so it is a equal power divider 3db power divider.

Professor: So it is a 3db power divider right. So these devices you have also simulated and experimentally evaluated?

Student: Yes

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Professor: And what is this one here we have

Student: This is of a slightly lower frequency, so this is in S band and this is a WR 284 wave guide and the dimensions are i think about 72 mm by 32 mm.

Professor: Ok. And the main application of this kind of umm wave guide is?

Student: Transferring high power to (())(04:33)

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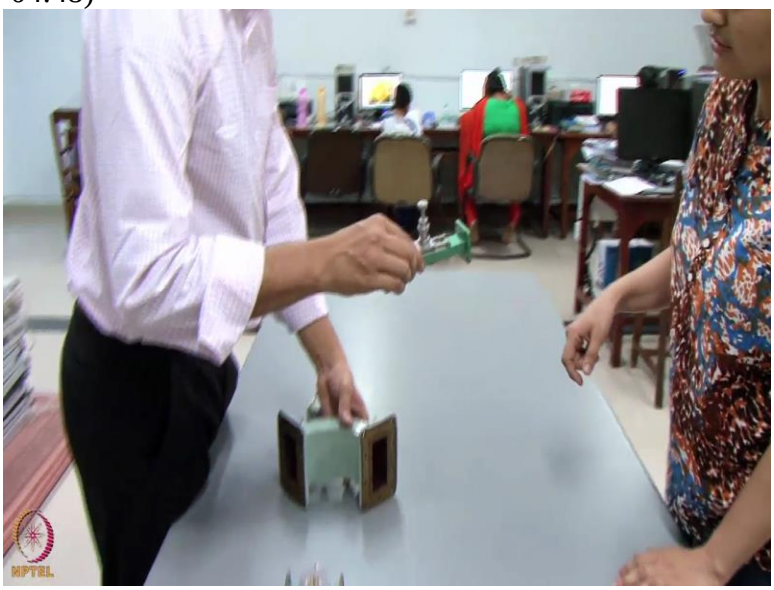

Professor: Excellent! And these things what you have here

Student: This is actually a tuner so we can slide this short in post to and fro and get various impedances on the other end.

Professor: So basically you can umm move this part up and then you can slide the thing ok

Professor: And the main application of this kind of things

Student: It is mainly for measurement kind of applications and we have a device and we want to find out what is optimum impedance so

Professor: ok, and this is also inS band

Professor: Thanks a lot! Mahima

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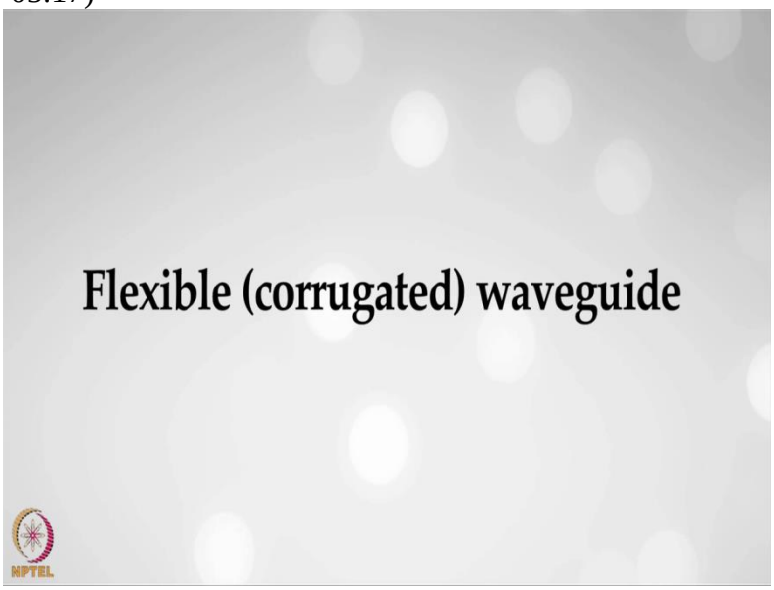

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“Professor - student conversation starts”

Professor: So Mayur could you please explain us about this particular wave guide because we saw about this wave guide but this is quite different. What is the dimensions of this? And what is special about this?

Student: This is basically a rectangular waveguide

Professor: ok

Student: Its dimensions in horizontal are 22 mm and vertical dimension it is 10mm

Professor: So it is very much like this old (())(05:48)

Student: Right Right!

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Professor: So what kind of frequency it is the range of?

Student: 8 to 12 Giga Hertz

Professor: OK, and what is very particular about this waveguide because i see that it is very bendy and it has certain corrugation?

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Student: Yeah! So in this particular waveguide you have these corrugations the neck is flexible in order for in some applications wherein we can connect two parts without the need of joint.

Professor: So and also the corrugation basically helps in bending it without affecting the operating ranges.

Student: Right Right!

Student: So the operating band is the same and we get the same band with some bending.

Professor: Thanks a lot! Mayur “Professor - studentconversationends”.

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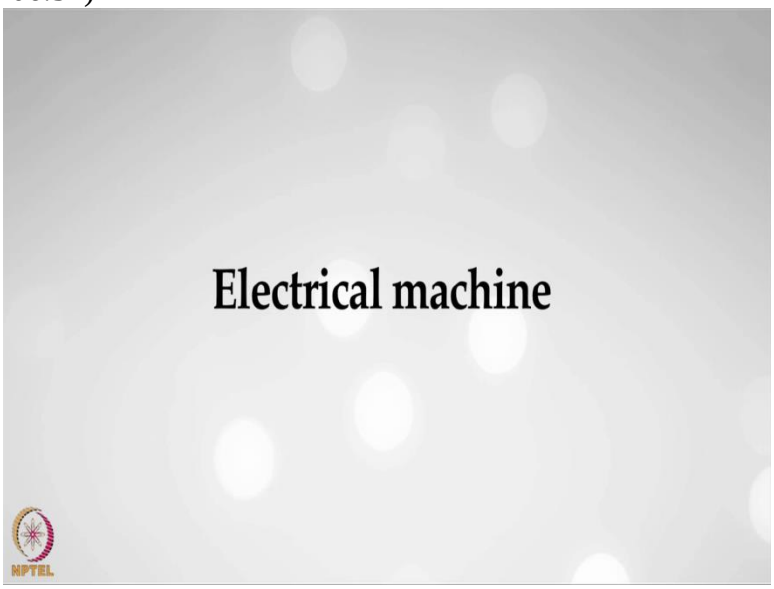

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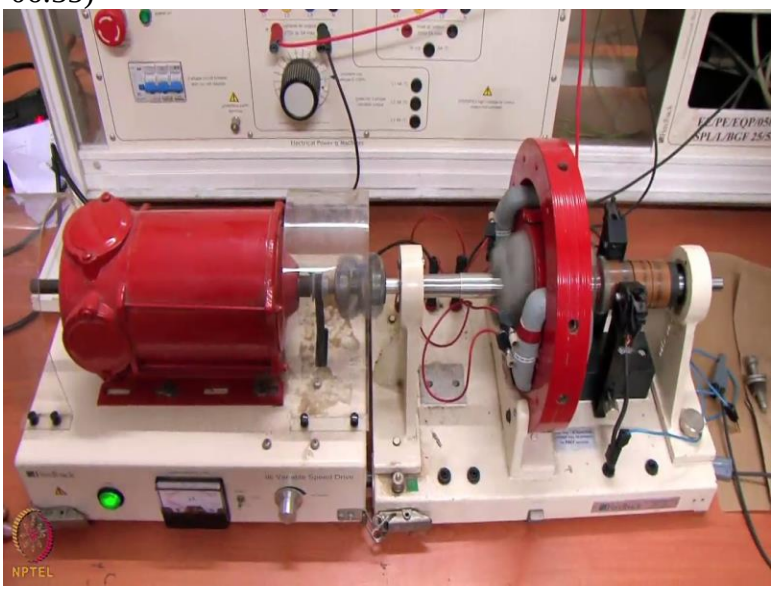

“Professor - student conversation starts”

Professor: So Ram Kumar could you please explain what is this configuration of this machine?

Student: This one is the dismantled set up where in the it is umm it can work both as motor or generator. This part

This part is generally used when that will be the generator this will be used as a to drive that

Professor: Ok Ok and umm could you please explain the reason for this configuration as in?

Professor: in the sense we generally have we can use it as a generator or motor

Student: Yeah

Student: When you are using a generator you need a force to drive it

Professor: ok yeah

Student: We are using variable frequency DC generator for it

Professor: yeah

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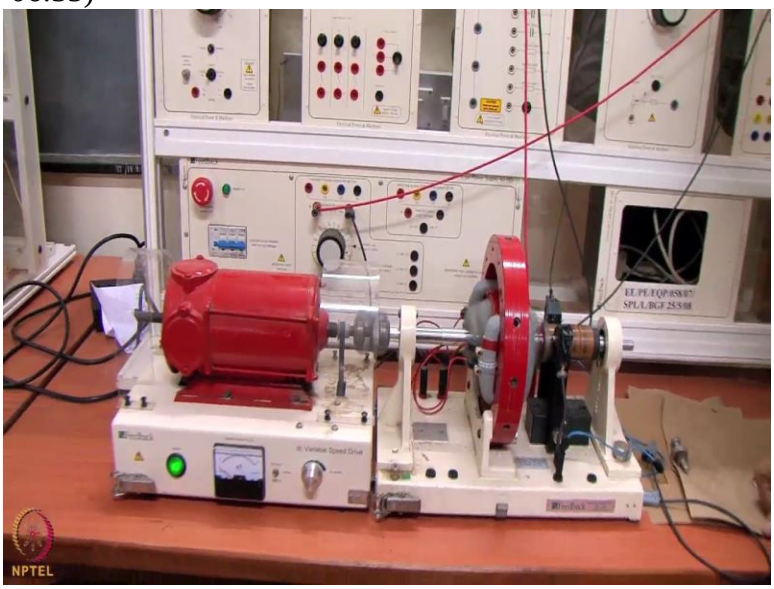

Student: and the other when you run it as a motor you just need to check all the parameters for this ())(07:37)

Professor: And would it be possible for us to describe

Student: Yeah we can remove everything which are kept here ())(07:47)

Student: The machine can be split into individual completely small small parts ())(07:50)

Professor: So could you please now dismantle it and show

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Professor: So Ram Kumar this is the Rotor

Student: Yeah this is the Rotor part and in this case you need to when it is working as a DC you need to get the DC supply, but then the induced voltage in the coils would be AC. So use commutator for it

Professor: So, This particular part is the commutator part and this one is the brush here

Student: Yeah! This might also be used as a slip rings. So in case of slip rings these are internally sorted

Professor: Ok

Student: But for commutator we directly connect here

Professor: Ok, and the coils here these are the strata coils

Professor: I am seeing that pretty much that you have different coil windings based on rating what you are having.

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Professor: So based on that you can pretty much assemble and run. And this particular machine is used both as a umm generator and or as a motor. And you have done quite a bit of simulation also on this kind of units Right?

And what is your power rating of this device.

Student: This one we can go upto quarter umm like umm quarter kilo watt in the sense 1 power watt so like 250watt

Professor: ok Excellent! Thanks a lot! "Professor – student conversation ends".