

Date: 2/16/19

Time: 3:30PM

Location: Power lab laboratory.

Attendees: Dr. Hess, Khalid Almutairi, Yuanchen Yan, and Jintong Zhang

Agenda that was discussed:

Giving us the introduction of power lab. We need to know how to use these machine. We can discuss about the machine as well. We also can discuss the budget about this project. We hope to have a good start about this project.

Things we did in the lab:

We did some experiments on the AC induction motor and we learned how it operates, and that was done by many connection that we did in the lab. Also, we did some experiments on the DC motor as well.

Other notes:

1. We should have done the team contract for the first draft.
2. Team contract has to be done by next week.
3. We need to bring our logbook for next meeting.
4. We need to contact with the ECE department in order to get the keys for the lab.
5. We need to some reading; Books that were advised : Electric Machinery Fundamentals 5th and wind turbine
6. TAs who can help Philip, Richardson

Date: 2/22/19

Time: 11.30AM

Location: Power lab laboratory.

Attendees: Dr. Hess, Khalid Almutairi, Yuanchen Yan, and Jintong Zhang

Agenda that was discussed:

Answered some questions about the AC induction machine and the homework that we read.

Things we did in the lab:

We talked about the presentation on March 5

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We propose the direction of discussion at the next meetings and the direction of experimental research. We should choose two of them to do experiments.

1. Speed
2. Direction of rotation
3. Start
4. Current
5. Voltage
6. Voltage per hertz
7. Voltage boost

Other notes:

1. We have two meets next week.
2. The homework is 6.1 and 6.4

Date:02/27/2019

Time: 12:15AM

Location: Power Lab Laboratory

Attendees: Dr.Hess, Khalid Almutairi, Yuanchen Yan, and Jingtong Zhang

Agenda that was discussed:

1. Our homework. (The problem is in the book 6.1 and 6.4)
2. What experiment we need to choose it? How can we do it?

Things we did in the lab:

Firstly, Dr. Hess gave us a problem we need to solve it. The problem is about a 60HZ motor, 4 poles, 1% slip. We need to know the speed, magnetic field angular velocity and rotor I frequency.

Solutions: $n_{sync}=120f_{se}/p=120*60/4=1800r/min$

$$n_m=n_{sync}(1-s)=1800*(1-0.01)=1782r/min$$

$$\omega_m=1782r/min*2\text{ rad/r}*1min/60s=186.61rad/s$$

$$f_{re}=sf_{re}=0.01*60=0.6HZ$$

Then, Dr. Hess introduced us three different kinds of machine. There are induction machine, synchronous machine, and double fed machine.

1. Induction machine

There are pictures about Induction machine.



Stator

rotor

It is three phases, four poles. There three color consist of in this stator. Magnetic field moves around a direction then move back. If the frequency is 60HZ, it turns 30 times a second. The current can through from rotor. It will produce force in this machine. Moving magnetic field would move generator voltage.

2.Synchronous machine



Stator

rotor

This machine works slower. These are two machines back to back. There are 12 poles in rotor. It moves the same speed. Magnetic field moved the same speed with stator and rotor. Putting the voltage in the rotor it can work.

3. double fed machine



It covers the function about induction machine and synchronous machine. Rotor and stator both have magnetic field. The rotor frequency plus the turn speed of machine is equal to frequency of stator. From this machine many people realized that these two machines are related to each other by magnetic field.

Lastly, professor asked us a question. It is 60HZ on stator and rotor, what is the speed? He made an experiment to help us know. If it is the same direction, the speed is zero.

Notes

We need to restate what Dr. Hess told to us in this meeting on Friday.

Date:03/01/2019

Time: 3: 30PM

Location: Power Lab Laboratory

Attendees: Dr. Hess, Khalid Almutairi, Yuanchen Yan, and Jintong Zhang

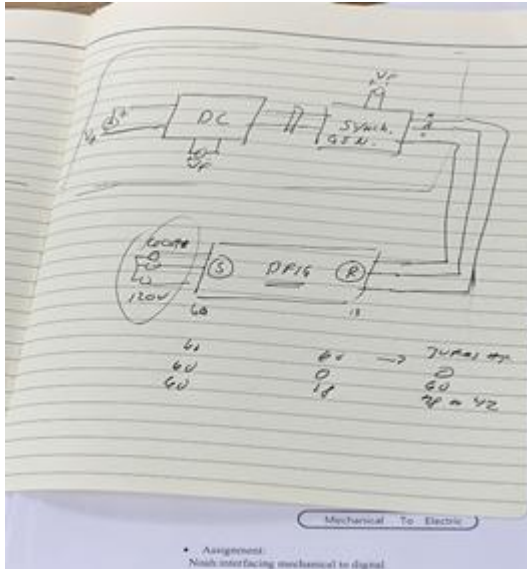
Agenda that was discussed:

1. We want to do an experiment about voltage per hertz
2. We have some problems about the snapshot on March,5. Do we need to do the experiment on that day? If we finish the experiment, what should we show them?
3. How is the poster like? Are there just some pictures about the experiments?
4. Do we need to finish the website before that day?
5. Review the things that we did on Wednesday.

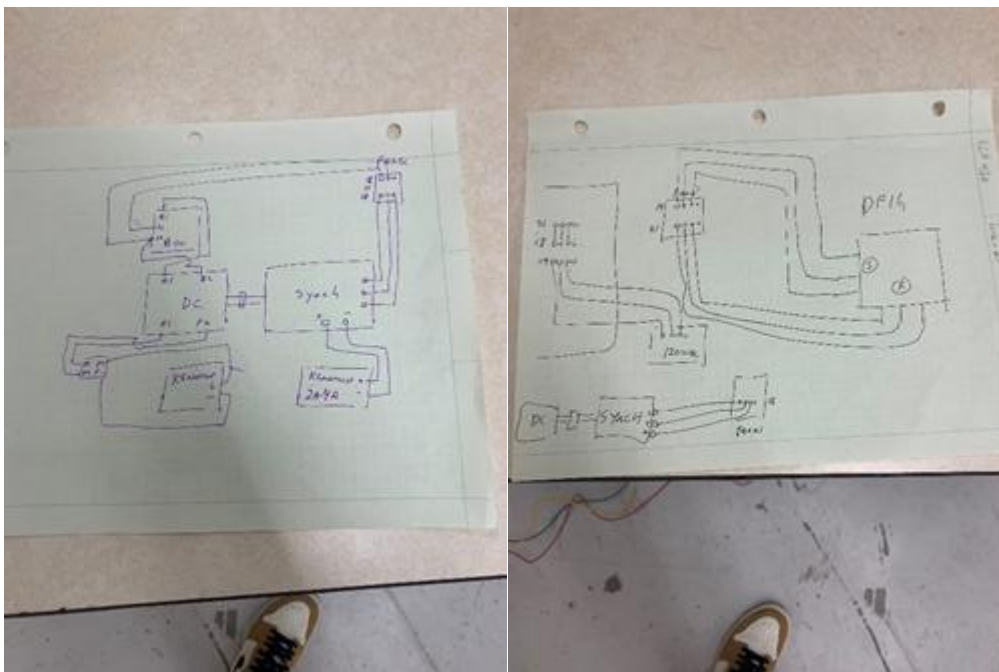
Things we did in the lab:

Firstly, we discussed what we should present in snapshot. How can we do to make it better? Dr. Hess told us we should present what we learned from past to this week and what we should finished for this project. Then, professor helped us to review the content about last meeting. The content is 60HZ on stator and rotor, what is the speed? If it is the same direction, the speed is zero.

Dr. Hess drew a picture to teach us doubly-fed machine. If the stator and rotor both 60HZ, the turn is zero. If one side is 60HZ the other side is 0HZ, the turn is 60HZ. If one side is 60HZ one side is 18HZ, the turn is 78HZ or 42HZ.



The last part is the most important. We do the experiment to combine the DC machine and synchronous machine. Dr. Hess drew the diagram to us.



The DC machine can control the speed. The synchronous machine can control the voltage. The current turns down the speed can be higher. The voltage increases the torque also increases.

Notes

1. We should explain this experiment to Dr. Hess in the next meeting on Tuesday.
2. Prepare our snapshot on Tuesday.
3. Finish our website next week.

Date:06/01/2019

Time: 12:30PM

Location: Power Lab Laboratory

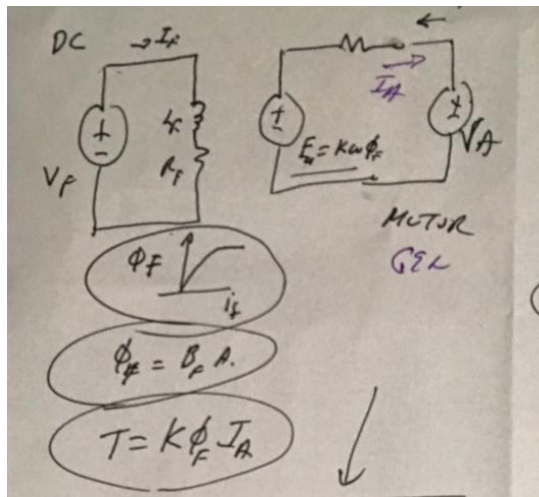
Attendees: Dr. Hess, Khalid Almutairi, Yuanchen Yan, and Jintong Zhang

Agenda that was discussed:

1. Review the experiment what we learned in the last meeting.
2. Give us more knowledge about three machines so we can speak it in snapshot better.
3. we should know more about the experiment we have learned.
4. adjust our attitude, hope we can succeed in our snapshot.

Things we did in the meeting:

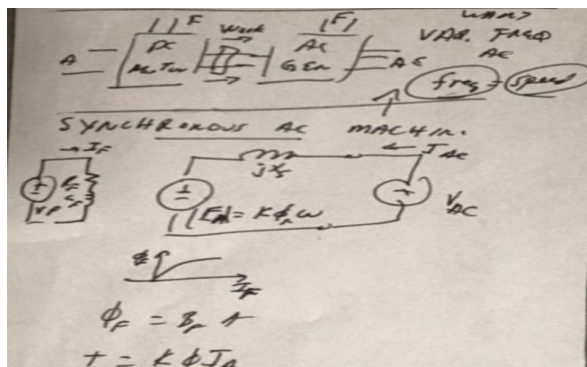
We started our meeting talking about the three types of machine that we going to work with which are DC machine, synchronous machine, and doubly fed



machine.

First, DC machine:

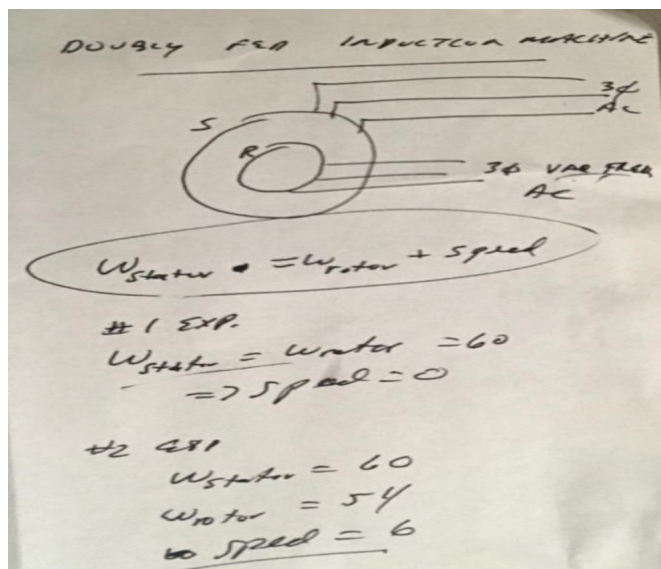
We discussed the basic concept of DC machine and how the field current can increase the magnetic field up to the point where it reaches the saturation



Second, synchronous machine:

We discussed the relationship between the frequency and speed and how the synchronous generate electrical energy

Third doubly fed



machine:

We discussed the relationship between speed,

ω_{stator} , and ω_{rotor} as shown in the figure

We were asked if it's possible to use the same machine as motor and generator at different time. And the answer is yes because the difference between them is where you put the energy in. For example, if you put some energy into the shaft and have some way to move the shaft and you make the machine turn, it will work as generator. However, if you bring energy electrically and make the machine turn it can then move energy out mechanically. At the end we did an experiment, and that was done by connecting the AC drive to rotor by putting 60 Hz.

Other notes:

We have homework that is due next meeting (6.5)

Read sections 6.9 and 6.10