COURSE	Name	: Electric Machine Dynamic
	Code	: EE185512
	Credit(s)	: 3
	Semester	: (Elective Course)

Description of Course

This course provides basic principles of electrical machine analysis that begins with the principle of electromechanical energy conversion. Based on this principle electromagnetic torque can be expressed in mechanical electric current and mechanical movement. To be able to make an analysis on an electric machine will be given a decrease in equivalent circuit of a magnetically coupled circuit, sinusoidally distributed winding, the concept of magnetomotive force in the air gap, and the decrease of winding inductance. The basic principle of the analysis is used to construct dynamic models of non-rotating and rotating electric machines such as transformers, dc machines and ac machines. The reference frame theorem is used to overcome the value of the inductance that changes with time due to the change of rotor position so that the order of the differential equations on the machine becomes simpler.

Learning Outcomes

Knowledge

(P02) Mastering engineering concepts and principles to develop the necessary procedures and strategies for systems analysis and design in the areas of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

Specific Skill

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

General Skill

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

Attitude

(S06) Working together, having social sensitivity and caring for community and environment.

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

Course Learning Outcomes

Knowledge

- Understand the concept of a magnetically connected circuit
- Understand the principle of conversion of electromechanical energy
- Understanding the construction of engine windings and magnetomotive force on the air gap
- Understand the dynamic modeling principle of dc engine
- Understand the reference-frame theory for the transformation of voltage and current values in the stationary circuit
- Understand the dynamic modeling principle of induction machine and synchronous machine

Specific Skill

- Able to derive a voltage equation in a circuit that is magnetically connected to transformer modeling
- Ability to calculate the energy balance in magnetic connected circuits for simple electromechanical systems
- Ability to arrange equations of voltage on the engine as function of inductance winding
- Capable of constructing dynamic equations of dynamic models of dc machines and compiling simulations using application software
- Able to use reference-frame theory for transformation of voltage and current values in stationary circuits
- Able to develop dynamic model of induction machine and synchronous machine using application software

Main Subjects

1. The connected circuit is magnetic
2. Conversion of electromechanical energy
3. Crystalline disbursed sinusoidal and air-gap mmf
4. Inductance winding and induced voltage
5. The voltage and torque equation of dc engine
6. Transformation of stationary variable variables into arbitrary reference-frames
7. The equations of voltage and torque on the machine variables
8. The transformation equation of rotor and stator circuit
9. The angle of the rotor and the angle between the rotor
10. Simulation of induction machine and synchronous machine

Reference(s)

[1] P. C. Krause, O. Wasynczuk, and S. D. Sudhoff, “Analysis of electric machinery and drive systems”, 2nd ed., New York: Wiley-IEEE, 2002
[2] Chee-Mun Ong, "Dynamic simulation of electric machinery using Matlab/Simulink”, Prentice Hall, 1998

Prerequisite(s)

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