Advanced Power Electronics

2 units (selection)

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Target〉 To understand and learn application technologies of power conversion control circuit using switching power devices.

Outline〉 Basic power electronics covers the basic operation and its characteristics of the static power conversion circuit by using switching power devicies. In the advanced power electronics, how to generate the switching control signal for these power conversion circuit ,how to construct the control system and how to apply the power converter to many apparatus are lectured and disccused . Subjects are as follows;harmonics analysis,rotating axes transformation,instantaneous active and reactive power, PWM control methds, Sinusoidal PWM control,PFC converter,interconnected inverter,active filter,reactive power compensator, sensorless controls.

Style〉 Lecture

Keyword〉 ***inverter, power supply, motor drive, utility interconnection***

Fundamental Lecture〉 "**Power Electronics**"(1.0), "**Electrical Machines (1)**"(1.0), "**Electrical Machines (II)**"(1.0)

Relational Lecture〉 "**Electrical Machine Dynamics and Controls**"(0.5), "**Electrical Machine Dynamics and Controls**"(0.5)

Requirement〉 Prerequisites: power electronics in undergraduate

Goal〉

1. Ability of theoretical analysis
2. Understanding the control operation of application circuit
3. Understanding the control system of application circuits
4. Understanding the operation of control systems

Schedule〉

1. Harmonics analysis
2. Rotating axes transformation
3. Instantaneous active power and instantaneous reactive power
4. PWM switching methods
5. Sinusoidal PWM inverter
6. Power factor correction converter
7. Midterm test
8. Utility interconnecting inverter
9. Active power filter
10. Reactive power compensator
11. Variable speed control of DC motors
12. Variable speed control theory of AC motors
13. Variable speed control system of AC motors
14. Application of power conversion for renewable energy
15. Final test
16. Explanation of the test and check of the results

Evaluation Criteria〉 Final examination 50%, Presentation (Participation) 50%

Textbook〉 None (Prints)

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216814

Contact〉

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