交通大學電機與控制系 電動機原理與控制

從馬達設計到馬達驅動系統設計

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2007年2月28日

Lab808: 電力電子系統與晶片實驗室

Power Electronic Systems & Chips, NCTU, TAIWAN

台灣新竹・交通大學・電機與控制工程研究所
From Motor Design to Motor Control

Control System
(Analog, Digital, Microcontroller, DSP, FPGA etc.)

Power Electronics

BLAC motor
Mechanical load
Optical Encoder

Schematic capture → Convert to Verilog
Motor Control – A Reading Road Map

Control of Electrical Drives,

Modern Power Electronics and AC Drives,

Automatic Control Systems,


Electric Machinery Fundamentals,


Power Electronics: Converters, Applications and Design,

Recommended Text Books for Motor Control

Advanced Electric Drives: Analysis, Control and Modeling Using Simulink,
Ned Mohan,

Electric Motor Drives: Modeling, Analysis, and Control,

Analysis of Electric Machinery and Drive Systems,
Basic Readings

DC Motors, Speed Controls, Servo Systems, including Optical Encoders, (Chap. 6: Brushless DC Motors)


**Recommended Books**

Vector Control of AC Machines

**Pioneer Paper**

“The principle of field orientation as applied to the new TRANSVECTOR closed loop control system for rotating field machines,”

30 years space vectors, 20 years field orientation, 10 years digital signal processing with controlled ac-drives - a review, part 1 & 2,

"Twenty Years of PWM AC Drives: When Secondary Issues Become Primary Concerns,"
Russel J. Kerkman,

3-Phase AC Induction Motor Vector Control Using a 56F80x, 56F8100 or 56F8300 Device,
Jaroslav Lepka and Petr Stekl,
Freescale AN1930, 2005.

**Power Electronics and AC Drives,**
Bimal K. Bose,

**Vector Control of Three-Phase AC Machines**
- System Development in the Practice,
N. P. Quang and J.-A. Dittrich,

**The Field Orientation Principle in Control of Induction Motors,**
Andrezej M. Trynadlowski,

**Vector Control and Dynamics of AC Drives,**
D. W. Novotny and T. A. Lipo,
Clarendon Pr, USA, September 1996.
Power Electronics and AC Drives

Bimal K. Bose,

Modern Power Electronics and AC Drives,
Bimal K. Bose,

Power Electronics: Converters, Applications and Design
N. Mohan, T. M. Undeland, and W. P. Robbins,

First Course on Power Electronics and Drives, Bimal K. Bose,

William Shepherd, Li Zhang Crowther, Li Zhang,
Power Converter Circuits,

Fundamentals of Power Electronics,
Robert W. Erickson and Dragan Maksimovic,
Digital Control of AC Drives


Control in Power Electronics: Selected Problems, Marian P. Kazmierkowski (Editor), Ramu Krishnan (Editor), Frede Blaabjerg, J. D. Irwin (Editor), Academic Press, 1st Ed., August 20, 2002.
Recommended Books for Induction Drives


Sensorless Control of AC Motor Drives


Sensorless Vector and Direct Torque Control, Peter Vas, Oxford University Press, Sept. 1998.


Permanent Magnet Synchronous and Brushless DC Motor Drives, Krishnan Ramu, Marcel Dekker, Sep 25, 2009.

Analysis of AC Drives

Analysis of Electric Machinery,
Paul C. Krause,

Analysis of Electric Machinery and Drive Systems,
P. C. Krause, O. Wasynczuk, and S. D. Sudhoff, IEEE
Press and Wiley Inter-Science, 2002.
High-Power Converters and AC Drives

High-Power Converters and AC Drives,
Bin Wu (吳彬)

Pulse Width Modulation for Power Converters: Principles and Practice,
D. Grahame Holmes and Thomas A. Lipo,
Servo System Design: Basic Readings

DC Motors, Speed Controls, Servo Systems, including Optical Encoders, (Chap. 6: Brushless DC Motors)

Incremental Motion Control: DC Motors and Control Systems,

現代直流伺服控制技術及其系統設計 (簡體中文)
秦繼榮、沈安俊,
機械工業出版社, 1999.

現代直流伺服控制技術及其系統設計 (簡體中文)
舒志兵,
Dana F. Geiger,
*Phaselock loops for DC motor speed control*,
References

Text Books

Basic Readings
References

Introduction to Motor Control

References – Control of PM Motors

**Brushless PM Motor Design and Control**