

Electric Machinery

电机学

Pinjia Zhang

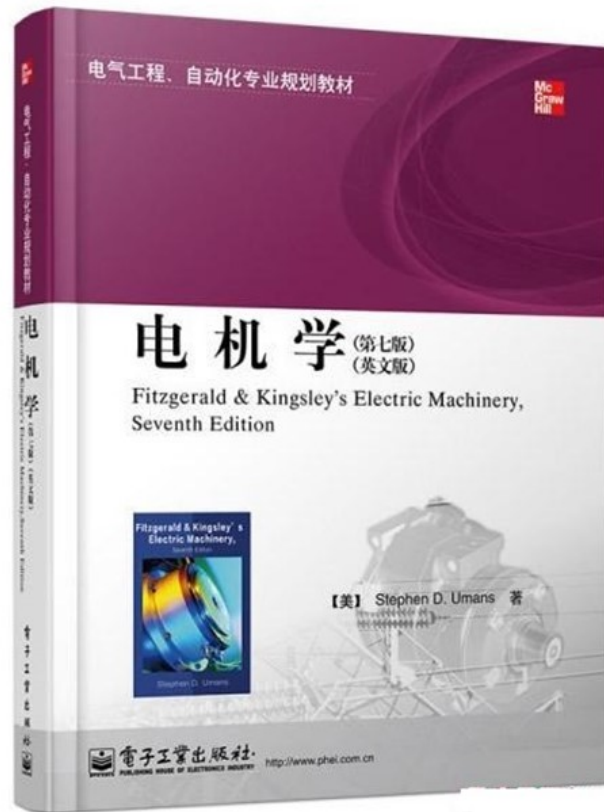


Self Introduction

- Pinjia Zhang
- West main building
3-314-1
- TEL:18500053899
- 张品佳
- 西主楼3区314-1
- 电话: 18500053899

Email: pinjia.zhang@tsinghua.edu.cn

Text Book

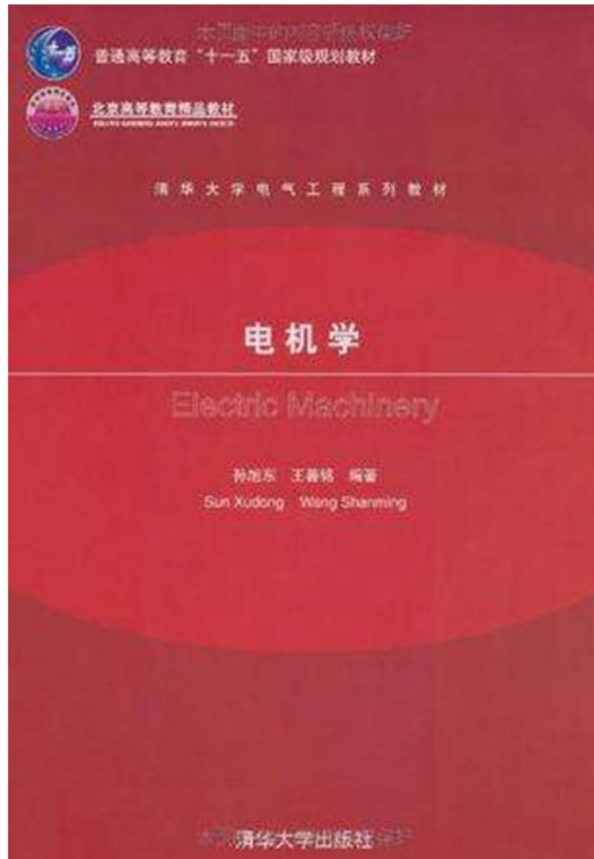


- Electric Machinery (Seventh Edition)
- Stephen D. Umans
- 电子工业出版社

Electric Machinery



Reference Book



- 电机学
- 孙旭东 王善铭
- 清华大学出版社

Problem Discussions

- 2 problem discussions
- Will include standard problem and open problems
- Volunteers for open problem discussion may be eligible for bonus points

Presentations

- Students will be divided into groups
- Every group provides a 20 min presentation on a given topic – a special type of electric machine
- Presentation needs to cover:
 - Fundamentals of the given type of machine
 - How does it convert energy?
 - Advantage & disadvantage
 - Where are they typically used? And why?

Assessment

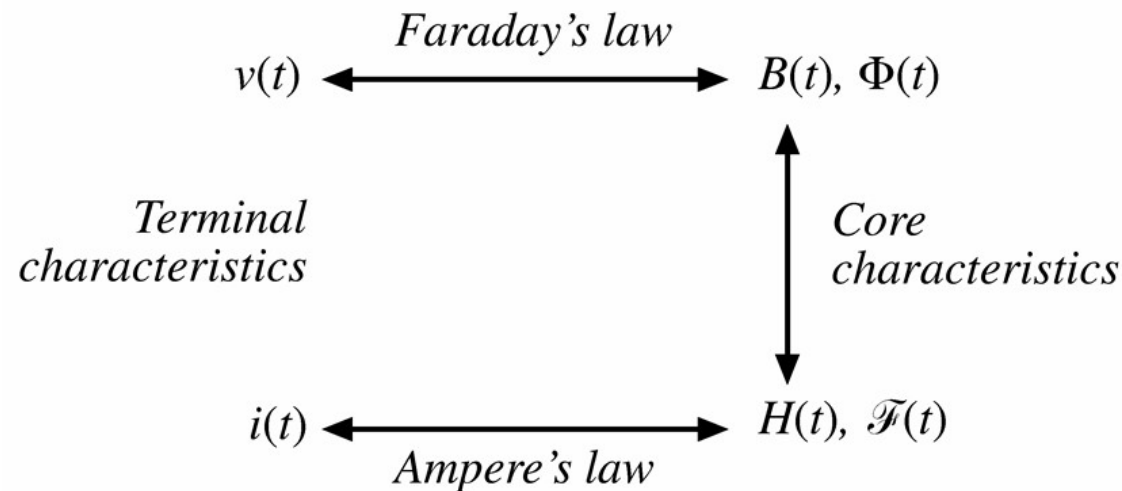
- Homework – 10%
 - Quiz– 10%
 - Presentations – 10%
 - Midterm Exam – 30%
 - Final Exam – 40%
-
- Problem discussions – additional bonus points available (up to 5%)

Course Info

- 以英文教材内容为主
- 在英文教材基础上增加部分内容
- 考试内容以讲授内容为准
- 专业英文词汇首次出现会标注并解释

Course Outlines - Overview of relative electromagnetic theories (1 wk)

- Magnetic field (磁场) : Ampere's law
- Magnetic flux (磁通) : magnetic material, hysteresis characteristics
- Voltage: Faraday's law



Course Outlines - Overview of relative electromagnetic theories (conti)

- Magnetic circuit (磁路)
- Motor/generator: Induced voltage, induced force

Course Outlines - Transformer (2wks)

- Ideal/non-ideal transformer (变压器)
- Equivalent transformer circuit (变压器等效电路)
- Voltage regulation, efficiency

Course Outlines - Basic electric machine (motor/generator) theories (3wks)

- AC machine: winding (绕组) structure
- Mmf (magnetomotive force , 磁动势)
- Emf (electromotive force , 电动势)
- How the motor rotates ?
 - Torque/speed
- How the generator builds output voltage ?
 - Voltage/current

Course Outline - synchronous machine (3wks)

- Synchronous generator (SG , 同步发电机) – the most widely used generator in the world
 - Structure and operation theories of SG
 - Equivalent circuit of SG
 - Voltage/current characteristics
 - Parallel operation
- Synchronous motor
 - Operation principles
 - Starting of synchronous motor
 - Torque/speed characteristics

Course Outline - induction (asynchronous) machine (3wks)

- Induction motor (IM , 感应电机) – the most widely used ac motor in the world
 - Structure and operation theories of IM
 - Equivalent circuit of IM
 - Torque/speed characteristics
 - Basic motor control
- Induction generator (rarely used)
 - Output voltage control
 - Voltage/current characteristics

Course Outline - DC machine (2wks)

- DC machines
 - Structure and operation theories of DC machines
 - Equivalent circuit of DC machines
 - Torque/speed characteristics
 - Basic motor control

