Electromagnetism 2

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1. Course Description

Students will learn the followings in this course,
(1) The idea and mathematical expression of the sources and fields
(2) How to calculate electromagnetic quantities in fields and circuits.
(3) Basics of electromagnetic wave engineering.

2. Course Objectives

The goal of this course is to acquire knowledge and skills to correctly calculate electromagnetic quantities in electromagnetic fields and circuits.

3. Grading Policy

You will be graded by your quiz results and submitted reports (total 50%) and final examination marks (50%). Quiz results and reports are returned within 2 weeks after submission.

4. Textbook and Reference

Textbook
The textbook is "Basics of Electromaginetism" by WADA Sumio (Japanese).
Supplementary English materials will be provided if necessary.

5. Requirements(Assignments)

Read the corresponding part of the text carefully and solve the example problems (˜3 hours).

6. Note

None.

7. Schedule

[1]	Electromagnetic induction and AC circuits 1 (Electromagnetic induction, difference from the electromotive force)
[2]	Electromagnetic induction and AC circuits 2 (Self induction, circuit of an inductor and DC source)
[3]	Electromagnetic induction and AC circuits 3 (Alternating current, circuit of an inductor and a capacitor)
[4]	Electromagnetic induction and AC circuits 4 (AC source and resistors, inductors, capacitors)
[5]	Electromagnetic induction and AC circuits 5 (Complex voltage and current, impedance, AC circuits)
[6]	Maxwell equations and electromagnetic waves 1 (4 laws of electric/magnetic fields)
[7]	Maxwell equations and electromagnetic waves 2 (Differential laws with sources and vortices)
[8]	Maxwell equations and electromagnetic waves 3 (Existence of electromagnetic waves)
[9]	Antenna systems 1 (Potential equations, electromagnetic radiation via antennas)
[10]	Antenna systems 2 (Antenna length and EM wavelength, antenna's impedance, directivity and gain)
[11]	Antenna systems 3 (Basic antennas, antenna variations, feeder lines and impedance matching)
[12]	Propagation of electromagnetic waves 1 (Speed and propagation of EM waves, cases of VHF/UHF/SHF waves)
[13]	Propagation of electromagnetic waves 2 (Electric field strength in free space, fundamental propagation loss, EM wave propagation over earth plane)
[14]	Propagation of electromagnetic waves 3 (Refraction, visible distance of EM waves, wave propagation in non-uniform air)
[15]	Propagation of electromagnetic waves 4 (Diffraction, fading, Mitigation of fading)