EE-576

Electromagnetic compatibility

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Cursus	Sem.	Type
Electrical and Electronical Engineering	MA2, MA4	Opt.
Energy Science and Technology	MA2, MA4	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	During the semester
Workload	60h
Weeks	14
Hours	**2 weekly**
Lecture	2 weekly
Number of positions	

Summary

In this lecture, students will get the basic knowledge on electromagnetic compatibility.

Content

1. EMC concept : Source of EM disturbances, victims, coupling path. Incompatibility problems and hierarchy of responsibilities.
2. Coupling Modes : Galvanic, inductive, capacitive, radiation. Calculation methods. Definition of and methods of measuring and calculating transfer impedance.
3. Low Frequency coupling models : Inductive and capacitive coupling. Equivalent coupling circuit. Determination of mutual capacitance and inductance. Methods for reducing interferences. Shielded and twisted cables
4. Transmission line coupling models : Transmission line parameters. Source term representation. Time-domain and frequency-domain solution of coupling equations. Coupling to shielded cables.
5. Electrosatic discharge : Causes, effects and protection methods.
6. EMC in electronic circuits : Grounding. Radiation of digital circuits. Protective measures
7. Shielding : Perfect shield. Field penetration. Shielding effectiveness. Shielding materials. Static field shielding. Shielding continuity. Apertures.
8. EMC in telecommunications. Biological effects of electromagnetic fields.
9. Lightning electromagnetic effects : Lightning phenomena. Different categories of lightning discharge. Cloud-to-ground lightning discharge. Direct and indirect effects of lightning.

Learning Prerequisites

Recommended courses

Electromagnetics I and II

Learning Outcomes

By the end of the course, the student must be able to:

- Identify and analyze sources of electromagnetic disturbances
- Identify the method of analysis of an EMC problem
- Be capable of analyzing electromagnetic interference problems
- Understand basic mitigating techniques in EMC
- Understand shielding mechanisms and electromagnetic coupling

Assessment methods

During the semester

Resources

Moodle Link

- https://go.epfl.ch/EE-576