

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	4
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	14
Hours	4 weekly
Courses	3 weekly
Exercises	1 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. Grounding, Balancing and Filtering** : Grounding philosophies, ground loops, non-ideal behavior of components, basic filter properties, common-mode rejection ratio
- 6. Shielding** : Perfect shield. Field penetration. Shielding effectiveness. Shielding materials. Static field shielding. Shielding continuity. Apertures.
- 7. EMC in electronic circuits** : Grounding. Radiation of digital circuits. Protective measure
- 8. 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

Teaching methods

Ex Cathedra presentations, demonstrations, lab sessions, assignments and mini-projects

Assessment methods

During the semester

Resources

Moodle Link

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