E8262 Jan 3:0

CAD for High Speed Chip-Package-Systems

Instructor

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Teaching Assistant

None
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Department: ECE

Course Time:

Lecture venue:

Detailed Course Page: http://ece.iisc.ernet.in/~dipanjan/E8_262/E8-262.html

Announcements

Brief description of the course

The objective of this course is to provide an exposure to fundamental numerical techniques used in modeling and simulation of high speed interconnects and power distribution networks as encountered in chip package systems.

Prerequisites

None

Syllabus

Module 1: Electrical Challenges in High Speed Chip-Package-Systems

Types of packages and PCBs

Packaging Trends

Review of Electromagnetic and Circuit basics

Signal Integrity

Power Integrity

Electromagnetic Interference and Electromagnetic Compatibility

Review of SPICE basics

Lumped models, distributed RLGC, S/Y/Z parameters

Module 2: 2D Electrical Characterization

Two conductor transmission line

2D Analysis: Multiconductor transmission lines (MTL) extraction

2D Analysis: MTL Frequency and Time Domain analysis

2D Analysis: MTL Channel simulation

Module 3: 2.5D Electrical Characterization

Power Distribution Network (PDN): Core and IO power

2.5D Analysis: Multilayered Finite-Difference Method (M-FDM)

2.5D Analysis: Gap and fringe correction

Decoupling capacitor placement

Simultaneous switching noise (SSN)

Module 4: 3D Electrical Characterization

Partial Element Equivalent Circuit (PEEC) method

Near and far field radiation

Comparison of 2D, 2.5D, 3D

Through-silicon-via modeling

Course outcomes

Students learn about different electromagnetic and circuit simulation methods

Grading policy

20 assignments

20 midterm

10 project

50 final

Assignments

Resources

Stephen H. Hall and Howard. L. Heck: Advanced Signal Integrity for High Speed Designs, 2009, IEEE Computer Society Press

Howard W. Johnson and Martin Graham: High Speed Signal Propagation: Advanced Black Magic, 2003, Prentice Hall

Madhavan Swaminathan and Ege Engin: Power Integrity Modeling and Design for Semincorductors and Systems, 2007, Prentice Hall