

Organisational Information

Sign up at: www.ecpe.org/events

Registration Deadline:

16 April 2024

Participation Fee:

- € 670,- * for industry
 - € 520,- * for universities/institutes
 - € 180,- * for students/PhD student
(limited spaces; copy of students ID required)
- * plus VAT

- The participation fee includes dinner, lunches, coffee/soft drinks and digital proceedings. The reduced (PhD) students fee includes all except for dinner (can be booked for an extra fee of € 50,-*)
- Digital proceedings will be provided by download link latest one day before start of the event. A printed handout is available on request (€ 50,-*).
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via email.
- 25 % discount for participants from ECPE member companies.
- 10% discount on university/institute fee for participants from ECPE competence centres.
- Further information (hotel list and maps) will be provided after registration and can be found on the ECPE web page.
- Cancellation policy: Full amount will be refunded in case of cancellation upon to 2 weeks prior to the event. After this date 50 % of the fee is non-refundable (replacement is possible).
- The number of participants is limited to 35 attendees.

17/04/24

Organisational Information

Organiser ECPE e.V.
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www.ecpe.org

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Prof. Dr. Ziwei Ouyang,
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Venue NH Hotel Padova
Via (Niccolò) Tommaseo, 61
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Source photo: NH Hotel Padova
Source graph front page: Ger Hurley, University of Galway

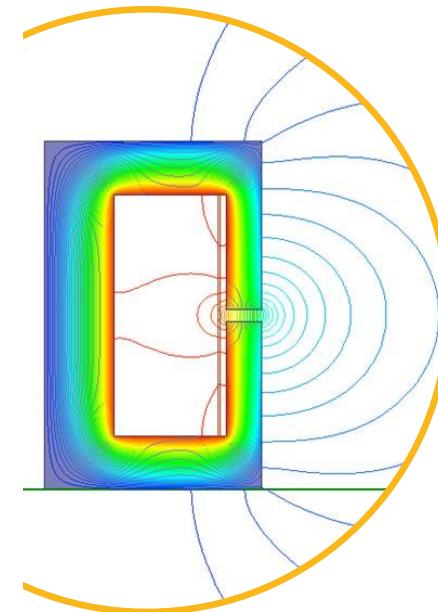


European Center for
Power Electronics e.V.

ECPE Tutorial

Passives in Power Electronics: Magnetic Component Design and Simulation

23 – 24 April 2024
Padova,
Italy



Passives in Power Electronics: Magnetic Component Design and Simulation

23 – 24 April 2024
Padova, Italy

Today, high efficiency and high power density converters are fundamental to the continued profitable growth of the telecommunications, automotive, aerospace and data processing industries. High-frequency operation can lead to a reduction in magnetics size and an increase in power density. The tutorial begins with the fundamentals of magnetic component design for inductors and transformers. Inductor design methodology includes multiple coil inductors such as the flyback converter. This is followed by transformer design, optimized for core and winding loss by proper selection of the maximum operating flux density based on the core loss properties. The winding is further optimized for high frequency loss with non-sinusoidal currents. Fringing, interleaving and litz wire are also covered. Practical designs include forward, push-pull and LLC resonant converters.

The 2nd day of the tutorial starts with the discussion of planar magnetics. Planar magnetics fabrication processes have several advantages over conventional magnetics: low profile, automated assembly and predictable parasitics amongst other. They also lend themselves to integrated magnetic solutions. Planar magnetic components are particularly suited to wireless power transfer because of their low profile. A simulation approach and the numeric models will be presented in order to allow an easy application of the tutorial contents to power magnetic component designs.

A sound understanding of different material properties is crucial for a proper choice of magnetic cores. The tutorial concludes with an in-depth overview and classification of industrially available permeable materials with a focus on high frequency applications.

The Tutorial is chaired by:

Prof. Dr. Ger Hurley, University of Galway (IRE)
Prof. Dr. Ziwei Ouyang, Techn. Univ. of Denmark (DK)
Dr. Jesus Acero, University of Zaragoza (ES)
Dr. Maeve Duffy, University of Galway (IRE)

All presentations and discussions will be in English.

Programme

Tuesday, 23 April 2024

09:30 Registration & Welcome Coffee

10:00 Welcome, Opening
Chris Gould, ECPE e.V.

10:15 Magnetics Design
Ger Hurley
- Review of fundamentals
- Inductor design
- Transformer design

12:30 Lunch

13:30 Practical Applications in Power Supply Design
Ger Hurley
- Inductor design: forward converter, flyback converter
- Transformer design: pushpull and LLC resonant converter

15:30 Coffee Break

16:00 High Frequency Considerations
Ger Hurley
- High frequency calculations for winding losses and core losses
- Fringing
- Interleaving
- Litz wire

17:00 Open questions from the 1st day

17:30 End of 1st Day

20:00 Dinner

Programme

Wednesday, 24 April 2024

09:00 Start of 2nd Day

09:00 High Frequency Materials for Advanced Magnetics
Maeve Duffy
- Review of fundamentals
- Inductor design
- Transformer design

10:30 Coffee Break

11:00 High Frequency Planar Magnetics for Power Conversion
Ziwei Ouyang
- Overview of planar magnetics
- High frequency eddy current effects: Interleaved windings, parallel windings
- High frequency leakage inductances
- Winding capacitances
- Magnetics integration

12:30 Lunch

14:00 Modelling and Simulation of Magnetic Components
Jesus Acero
- Modelling of inductors and transformers by means of electrical impedances
- Finite element simulation: assumptions, limitations and practical approaches
- Analytical-finite element mixed modelling
- Introduction to efficiency optimization
Experimental verification, modelling and simulation of magnetic components

16:00 Final Discussion

16:15 End of Tutorial