

Workshop: Advanced Modeling and Simulation of Power Electronic Systems at the University of Nottingham

Nottingham, March 8th and 9th, 2010

Speakers: Prof. Pat Wheeler, University of Nottingham
Dr. Fabio Carastro, Research Fellow University of Nottingham
Dr. John Schönberger, Research and Applications Engineer Plexim

Agenda: March 8 Modelling and simulation

10:00 am **Arrival & Coffee**

10:30 am **Simulation of power electronic systems**

- An introduction in modelling and simulation techniques

Introduction to PLECS

- Operating principle of PLECS
- Interaction with the Simulink solver; stiffness; zero-crossings
- Introduction to PLECS Standalone

12:30 pm Lunch

1:30 pm **Example:** Thermal modelling applied to a Long Pulse Resonant Converter

Thermal modelling concepts for system simulation

- Heat sink concept & defining losses

Advanced features of PLECS

- Steady state analysis
- Control design tools

Exercise: Modelling of a forward converter

Exercise: Thermal modelling of a buck converter

Exercise: Non-linear and custom components models

- Development of a non-linear photovoltaic model using PLECS
- Creating custom component models using the PLECS sub-circuit

5:00 pm End of day 1

March 9 Advanced Modelling and Simulation, Small signal analysis and control design

9:00 am **Use of the C-Script block in PLECS**

- Custom controllers & components

Exercise: Implementing a state machine and a PI controller

12:30 pm Lunch

1:30 pm **Exercise: Control system design using PLECS**

- Modelling a current-controlled flyback converter
- Using AC sweep and impulse response tools to obtain the bode plots of plant & controller
- Loop gain prediction
- Using the state space extraction tool for analogue controller and filter design

Discussion and Outlook (Plexim Product Roadmap 2010-2012)

Q&A (Please send in any topics you may have in advance)

5:00 pm End of day 2

Venue: The University of Nottingham

The workshop contains hands on exercises. Please bring your own computer with you. PLECS licenses may be obtained ahead of the workshop from: http://www.plexim.com/store/plecs_trial.html

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