Workshop: Advanced Modeling and Simulation of Power Electronic Systems

Aalborg University, Aalborg, September 6 & 7, 2010

Speaker Dr. John Schönberger, Research & Applications Engineer, Plexim GmbH

Sep 6	08:30	**Beginning of Workshop: Welcome and Introduction**
		Introduction into PLECS • General use of PLECS • Instantaneous switching • Variable and fixed step operation **Thermal modeling of power electronic systems** • Combined electrical thermal simulation using lookup tables • Thermal loss descriptions of conduction & switching losses • Electrical feedback of thermal losses **Exercise**: Thermal modeling of a buck converter **Exercise**: Full bridge inverter thermal design
	10:30	Coffee break
		Exercise: cont. **Numerical Simulation of Dynamic Systems** • Stiff vs. non-stiff solvers, stability domains • Accuracy considerations, step-size control • Proper handling of discontinuities, zero-crossing detection
	12:30	Lunch
		Advanced features of PLECS • AC sweep and impulse response analysis • Advanced modeling techniques for increasing simulation speed • Implementing of custom components **Example: Doubly-fed induction generator** • System overview and modeling approach • Techniques for speeding up the simulation • Average converter modeling • Averaging space vector modulator **Exercise**: Implementing a custom PV string model
	17:30	**End of day 1**

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Sep 7	08:30	**Use of the C-script block** • Function call interface • Time settings and macros • High speed logic emulation **Example**: Space vector control of a three phase boost rectifier
	10:00	Coffee break
	10:30	**Exercise**: Implementing a digital PI controller with control delay. **Exercise**: Using a state machine for sequence generation
	12:30	Lunch
	13:30	**Control system design and advanced modeling techniques** • Introduction to the flyback converter • A design flow using PLECS tools • Use of the state-space extraction tool **Exercise**: Control design for a flyback converter
	15:30	Coffee break
		Exercise: Control design for a flyback converter (cont) **Discussion and Outlook**
	17:00	**End of workshop**

Venue	Aalborg University The workshop contains hands on exercises. Please bring your laptop computer with you. PLECS 3.1 licenses may be obtained ahead of the workshop from www.plexim.com.
Contact	Aalborg University, Maria Hald, mha@iet.aau.dk
Cost	**4000.- DKK**