

# EPE TUTORIAL

## Advanced Modelling and Simulation of Power Electronic Systems

EPE 2015 ECCE Europe – CIGR Geneva, September 7, 2015

(The Tutorial contains hands-on exercises; a computer with PLECS Standalone installed will be needed)

08:00	<b>Registration</b>
09:30	<b>Introduction to PLECS</b> <ul style="list-style-type: none"><li>▶ General use of PLECS Blockset and PLECS Standalone</li><li>▶ Instantaneous switching</li><li>▶ Variable and fixed-step operation</li></ul> Exercise: Modelling a switched-mode power supply
11:00	<b>Break</b>
11:30	<b>Solver Settings</b> <ul style="list-style-type: none"><li>▶ Definition of stiff and non-stiff systems</li><li>▶ Explicit and non-explicit solvers</li><li>▶ Stability domains</li><li>▶ Accuracy considerations, step size control</li><li>▶ Proper handling of discontinuities, zero-crossing detection</li></ul> Exercise: Solver accuracy and settings
13:00	<b>Lunch</b>
14:00	<b>Introduction to Thermal &amp; Magnetic Modelling &amp; Simulation</b> <ul style="list-style-type: none"><li>▶ Switching &amp; conduction loss descriptions</li><li>▶ Combined electrical-thermal simulation</li><li>▶ Permeance Capacitance Analogy Model</li></ul> Exercise: Thermal modelling of a buck converter
15:30	<b>Break</b>
16:00	<b>Overview of PLECS Tools</b> <ul style="list-style-type: none"><li>▶ AC Sweep and Impulse Response Analysis Tools</li><li>▶ Steady State Analysis Tool</li><li>▶ Implementing custom components</li></ul> Exercise: Creating a custom PV string component
17:30	<b>End of day</b>
<b>Authors</b>	Niklaus Felderer, Min Luo, Felix Prauße, Orhan Toker - Application and software engineers, Plexim GmbH
<b>Scope</b>	This tutorial is designed for engineers to improve and deepen their understanding of modelling and simulation of power electronic systems. Using presentations, demonstrations, discussions and hands-on exercises the subject is learned and applied on specific problems.
<b>Benefits</b>	"The team at the University of Nottingham find the annual PLECS Workshop very worthwhile and our researchers enjoy the valuable opportunity to learn from the application and software engineers as well as providing feedback for further development of PLECS." — Dr. Pat Wheeler, Professor of Power Electronic Systems at the University of Nottingham