

# PLECS WORKSHOP

Advanced Modeling and Simulation of Power Electronic Systems  
University of Bologna / Università di Bologna, April 3rd, 2023

08:30	Registration
09:00	<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: Modeling a switched-mode power supply
10:00	Break
10:30	<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>
12:00	Lunch
13:00	<b>Introduction to Thermal, Magnetic &amp; Mechanic Modeling &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 modeling of a buck converter
14:30	Break
15:00	<b>Overview of PLECS Tools</b> <ul style="list-style-type: none"><li>▶ Custom components</li><li>▶ Steady State analysis</li><li>▶ Small signal analysis</li><li>▶ State machine, C-Script and the DLL block</li><li>▶ Simulation scripting</li></ul> Exercise: Building a modulator using the state machine block
16:00	<b>Overview and Introduction to the PLECS RT Box</b> <ul style="list-style-type: none"><li>▶ Hardware-in-the-Loop (HIL)</li><li>▶ Rapid control prototyping (RCP)</li><li>▶ Demonstration of a real-time simulation</li></ul>
16:30	End of day
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