Course Title: Advanced Modeling and Simulation of Power Electronic Systems

Speakers:

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John Schönberger attended the University of Canterbury in New Zealand from 1999 till 2005, completing a PhD in the field of power electronics and renewable energy systems. The focus of his research was the intelligent, distributed control of a standalone dc microgrid based on renewable-based sources and power electronic building blocks. In 2006 he joined the Power Electronic Systems group at the ETH in Zürich as a Postdoctoral Researcher. During his role there he was involved with the design of converters for aerospace applications and the development of new current control strategies. In 2008 he joined Plexim as a Research and Applications Engineer. His work at Plexim has included developing novel techniques for thermal simulation and creating new models in the areas of renewable energy systems and drives. His research interests include power electronics for renewable energy applications and hybrid vehicles, and control techniques for power electronics.

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Kristofer Eberle attended Northeastern University in Boston, MA and graduated summa cum laude with a B.S. in electrical engineering. He completed some research in the area of power systems under Dr. Ali Abur and had graduate coursework in power electronics. He joined Plexim, Inc. in the summer of 2010 as an Applications Engineer. His interests include sustainable energy generation and use, including photovoltaic and wind power extraction and electric vehicles.

Short-Course Description:

The goal of this tutorial is to provide insight into the operation of the continuous variable-step solvers that are used for simulating power electronic systems. The solver is often viewed as a ‘black box’ since this is typically not a topic that is taught in electrical engineering courses. The idea is to shed light on the inner workings of the solver so that the user can understand better how to configure the solver for the problem at hand. The solver operation will be presented within the context of power electronic system simulation and real-life examples will be given in order to reinforce the presented concepts.

The second objective is to explain practical techniques for speeding up a large system model that comprises dozens of states. The correct simulation approach can make the difference between a simulation that takes several minutes or several hours. Averaged converter modeling will be discussed since this can speed up the simulation by over an order of magnitude. Thermal modeling will also be discusses because simulating a combined electrical-thermal model can be problematic due to the large thermal time constant.