Seminar 22 Monday June 18, 2001

PROFESSIONAL ADVANCEMENT COURSE SIMULATION-BASED DESIGN OF INTEGRATED POWER ELECTRONIC SYSTEMS

9:00am - 6:00pm

Instructor: Prof. Joachim Aurich, University of Applied Sciences Koblenz, Germany, Uwe Knorr, SIMEC GmbH & Co. KG, Chemnitz, Germany

ABOUT THE INSTRUCTORS

Dr. Uwe Knorr is Vice President of the SIMEC GmbH & Co. KG and responsible for development of the Simulation System SIMPLORER. He studied and graduated at the Technical University of Chemnitz.

Prof. Joachim Aurich is Professor for electronic components at the FH Koblenz.

COURSE OVERVIEW

This course will describe SIMPLORER, a powerful approach to simulating power electronics and drive technology. SIMPLORER's fast and numerically stable technology and the non-SPICE simulation core provide an unusually high numerical stability, combined with a high calculation speed. Comprehensive libraries of power devices, standard electronic components and function blocks (including common structures for rectifiers and inverters, supplies and loads, control elements, motor and transformer models) will be introduced. Easy and efficient modeling techniques will be presented. In the second part of the course a novel approach for the modeling of power semiconductors will be presented. Based on a multi-level concept all necessary steps for the model generation will be shown. A comparison between conventional macro modeling and modeling using SIMPLORER´s direct solver access illustrates the advantages of the C/C++ based direct solver matrix implementation.

COURSE SCHEDULE

1. **Introduction in modeling and simulation methods for Integrated Power Electronic Systems**
2. **Multi-domain modeling using a mixed language approach**
3. **Behavioral modeling methods**
4. **SIMPLORER modeling capabilities in application examples:**
   - Switched Mode power supplies, inverters
   - Digital control systems (PWM, closed loop, etc.)
   - Electrical drive system
   - Power Electronic System Modeling
5. **Semiconductor modeling**
   - Multi-Level Modeling Approach
   - Modeling of voltage-controlled switches (IGBT or Power-MOSFET)
   - Modeling of free wheeling diodes with soft recovery behavior
   - Modeling of thermal properties
   - How to get model parameters
   - Influence of non-linear parasitics

MATERIALS AND HANDOUTS

Each participant receives a paper copy with notes space of the course presentation.

WHO SHOULD ATTEND

- Power electronics engineers
- Technical managers
- Designers of power electronics and drive systems
- Developers of power semiconductor models
- Consultants in the power electronics and drive technology area
- Teachers