BEHAVIORAL AVERAGE MODELING AND SPICE SIMULATION OF PWM AND RESONANT CONVERTERS

both days 9:00 am – 6:00 pm

Instructor: Prof. Sam Ben-Yaakov, Ben-Gurion University, Israel

ABOUT THE INSTRUCTOR

Prof. Sam Ben-Yaakov received his PhD degree from the University of California at Los Angeles, UCLA, in 1970. He is presently professor at the Department of Electrical and Computer Engineering, Ben-Gurion University, Israel. He also serves as an independent consultant to industry on issues of Power Electronics, Analog Circuit Design and Simulation.

CONTENTS

- Overview of simulation methods
- Commercial 'average PWM' modules
- Commercial simulators
  - Syntax / Type of analyses
  - Convergence problems
- The SIM/GSIM averaging methodology
  - DCM/CCM
  - Duty Cycle Generator DCG
  - Examples
- Peak Current Mode / Average Current Mode
- MAGAMP regulators
- SEPIC converters
- CUK converters
- Dynamics of PWM systems
  - Stability
  - Feedback design
  - Loop gain and phase margin
- Power Factor Correction System
  - Large signal analysis
  - Small signal analysis
  - Feedback loops design
  - Examples
  - Analysis and design of new control strategies
- Average simulation of resonant converters
  - Series-Parallel Resonant Converter
  - Series Resonant Converter
- BEHAVIORAL MODELING OF NONLINEAR LOADS
  - Fluorescent lamp
- SPECIALIZED TOPICS
  - Can SPICE teach us?
  - Current sharing
  - Ripple estimate
  - Symbolic expression
- ENVELOPE SIMULATION

SEMINAR BENEFITS

- Introduces advanced features of modern circuit simulators
- Elucidates how to derive behavioural average models of switch mode, resonant converters and specialized loads
- Explains how to apply simulation tool in the design of feedback loops
- Demonstrates the design details of the feedback loops in APFC
- Illustrates how simulation can help the creative engineering process
- Introduces a new simulation tool: ENVELOPE SIMULATION

WHO SHOULD ATTEND

- Power supply engineers
- Power quality engineers
- 'Analog Electronics' engineers interested in power electronics circuits

THE SEMINAR WILL BE CONDUCTED IN A PC CLASS FOR HANDS-ON EXPERIENCE, USING PSPICE EVALUATION VERSION 8.

A SAMPLE DISKETTE WILL BE GIVEN TO EACH ATTENDEE FOR FUTURE REFERENCE.