Teaching Power Electronics to Undergraduates: Double the Breadth AND the Understanding

Part 1: Wednesday May 25th, 2005 8:30-10:30AM (Minneapolis)

(a) Switching Power-Pole as the Building Block: It can be used to analyze most of the converters from switch-mode dc-dc converters to 3-phase ac inverters. Benefits of doing so are enormous as will be described.

(b) Designing Controllers for DC-DC Converters and PFC Circuits: This topic is often left out in an undergraduate course, but by using the average model of the switching power-pole in PSpice, it can easily be included.

Part 2: Thursday May 26th, 2005 8:30-10:30AM (Minneapolis)

(c) Voltage Space-Vector PWM: SV-PWM allows approximately 15% higher output voltage capability compared to Sine-PWM. This important concept can be included in an undergraduate course by explaining it in a simple manner.

(d) Demystifying Matrix Converters: Although it may not be possible to cover them in the undergraduate course due to the time limitation, Matrix Converters have several potential advantages. A novel carrier-based PWM scheme, which is very simple to understand and easy to implement, and a simple average model will be described.

Reference Textbook:

1. *First Course on Power Electronics* by N. Mohan, published by MNPERE (www.mnpere.com).