

Circuit and Field Simulations in High Voltage Power Supply Practice

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Abstract: the course is intended for engineers and researchers in the field of high voltage electronics who want to use circuit and field simulations in everyday practice of designing HV power supplies. Influenced heavily by the instructor experience, the lecture focuses on the power circuitry of high-performance switchmode power supplies ranging from units to hundreds of kV and up to hundreds of kW. The target of circuit simulations made on a PSpice platform are dc-to-dc converters as the most challenging blocks of HVPS. The emphasis is on defining the parasitics from field simulations, ultimately, to the level of performing coupled analyses. Field simulations (FEA on COMSOL platform) encompass electrostatics (for insulation design), electromagnetics (design of transformers, chokes, etc., with account for eddy currents), heat transfer and multiphysics. Most of the FEA topics are illustrated by live simulations of real-life systems.



Alex Pokryvailo (M'05–SM'07) was born in Vyborg, Russia. He received the M.Sc. and Ph.D. degrees in electrical engineering from the Leningrad Polytechnic Institute in 1975 and 1987, respectively. Formerly with Soreq NRC, Yavne, Israel, now he is with Spellman High Voltage Electronics Corp., where he has been serving as Director of Research for 16 years transitioning lately to the role of Engineering Fellow. His current and recent experience relates to research and design of HV high-power switchmode power supplies, insulation testing, multiphysics simulations, Pulsed Power, fast diagnostics, and corona discharges. Previously, he studied switching arcs, designed SF6-insulated switchgear, researched interaction of flames with electromagnetic fields, etc. He has published 150 papers, two textbooks (in Hebrew), and more than 20 patents pertaining to HV technology. He has also taught undergraduate and graduate courses on HV techniques in Israel and USA.

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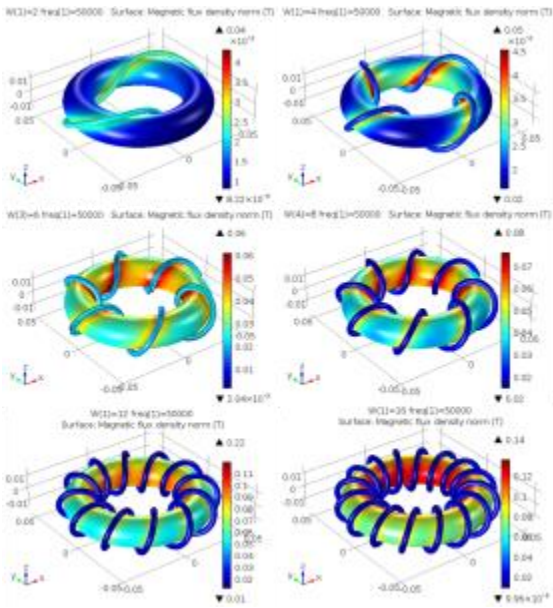


Figure 1. suggested pic