

EMC MARATHON 2022

Binational Edition

Part 7: Poland - Denmark, 21st April 2022

MARATON EMC2022 Binational Edition is continuation of the series of on-line courses initiated by the IEEE EMC-S PL Board of the Electromagnetic Compatibility Society Polish Chapter of the IEEE (USA)

Main theme: EMI/EMC Modelling and Assessment in Power Electronics

AGENDA

Topic I	Power Converter Impedance and Emission Characterization Below 150 kHz
Date	21st April 2022, 9:30 - 10:15 (CEST)
Description	IEC standardization is preparing general conducted emission limits for grid connected power converters in the frequency range between 2 kHz and 150 kHz, which has until recent years only been regulated for some categories of equipment. With the necessity of analyzing and estimating power converters behavior, this presentation focuses on a black-box modeling approach suitable for this new frequency range of interest. A method for measuring the dynamic power converter impedance during operation has been developed and proven in practice by superposition of a multi-tone signal onto the AC input voltage to the power converter under different load conditions. Later, through extraction of the noise source, an equivalent circuit diagram of the power converter is developed which can be used for emission estimation and further analysis such as EMI filter designing. The provided experimental results showed high accuracy of the proposed method and its suitability in estimating EMI below 150 kHz as a cost-effective and time-efficient approach.
Speaker	Pooya Davari AAU Energy, Denmark Per Thåstrup Jensen FORCE Technology, Denmark
Topic II	Full Wave Hybrid Simulation of a Flyback Converter
Date	21st April 2022, 10:30 - 11:15 (CEST)
Description	In power converters the main contribution to the radiated emission from power converters is common-mode current on the attached cables. Center for Industrial electronics, University of Southern Denmark suggests a method which use hybrid simulation to reduce modelling effort and simulation time in a step to use full wave simulation as investigation tool. The method combines measured S-parameters with 3D full wave simulations. The hybrid model, which is still premature, was tested and results were compared with near-field scan.
Speaker	Morten Sørensen University of Southern Denmark, Odense, Denmark

Topic III	In situ EM field measurement of high-power bus charging stations
Date	21st April 2022, 11:30 - 12:00 (CEST)
Description	The presentation show the practical approach of both electric and magnetic field in-situ measurements from high-power bus charging stations' installations
Speaker	Adam Maćkowiak, Krzysztof Sieczkarek Radio Technologies and Electromagnetic Compatibility Laboratory, Łukasiewicz Research Network - Poznań Institute of Technology, Poland
Topic IV	LabVIEW-FPGA-based Testbench for EMI Analysis in Variable Speed Drives
Date	21st April 2022, 12:15 - 12:45 (CEST)
Description	Several parameters compromise the variable speed drives' performance in switching modulation techniques for non-linear loads e.g., modulation index and switching frequency. Using a LabVIEW-based FPGA testbench is possible to verify the impact of those parameters on EMI in conducted emissions and assess EMC
Speaker	Douglas Nascimento PhD candidate University of Zielona Góra, Poland and University of Twente, Early Stage Researcher in the ETOPIA project
Topic V	Control algorithms to Mitigate the MMC EMI levels
Date	21st April 2022, 13:00 - 13:30 (CEST)
Description	Multilevel Modular Converter (MMC) is a popular type for lowering the Electromagnetic interference (EMI) emissions in high voltage and medium voltage applications. Next to the inherent reduction of EMI associated with MMC much can be gained by tuning its own components and operating algorithms. This paper presents a study on the relation between the emission levels and the control algorithms used for the operation
Speaker	Amr Madi PhD candidate University of Zielona Góra, Poland
Moderator	Krzysztof Sieczkarek Łukasiewicz Research Network - Poznań Institute of Technology Chairman of IEEE EMC-S PL, Coordinator of IEEE EMC-S R8

Event organized by IEEE EMC-S PL in co-operation with IEEE EMC-S DK

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