

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING

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Area: Microwave & Radio Frequency (MWRF)

Host: Dr Zhao Zhenyu

Technical Seminar Jointly Organized by ECE/NUS, IEEE Singapore EMC, MTT/AP, and RFID Chapters

TOPIC	:	Field-to-Transmission Line Coupling Models with Emphasis on Lightning-Induced Voltages
SPEAKER	:	Prof Farhad Rachidi École Polytechnique Fédérale de Lausanne (EPFL) Lausanne, Switzerland
DATE	:	Wednesday, 22 April 2026
TIME	:	2:30PM-4:00PM
VENUE	:	E5-02-32

ABSTRACT

We discuss the Transmission Line (TL) theory and its application to the problem of electromagnetic field coupling to transmission lines. We start with the derivation of the general field-to-transmission line coupling equations for the case of a single-wire line above a perfectly conducting ground. The derived equations are solely based on the thin-wire approximation and they do take into account high frequency radiation effects. Under the transmission line approximation, the general equations reduce to the TL-based field-to-transmission line coupling equations. After a short discussion on the underlying assumptions of the TL theory, three seemingly different but completely equivalent approaches that have been proposed to describe the coupling of electromagnetic fields to transmission lines are presented. Key historical aspects of research on lightning-induced voltages are also presented and discussed.

BIOGRAPHY

Farhad Rachidi (IEEE Fellow) received his Ph.D. degree in Electrical Engineering from the Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland, in 1991. He worked at the EPFL Power Systems Laboratory until 1996 and held several short-term research appointments at the University of Florida and NASA Kennedy Space Center. In 1997, he joined the Lightning Research Laboratory at the University of Toronto, Canada, and from April 1998 until September 1999, he worked at Montena EMC in Switzerland. He is currently a Titular Professor and the head of the Electromagnetic Compatibility (EMC) Laboratory at EPFL, Lausanne, Switzerland.

Professor Rachidi has authored or co-authored over 300 peer-reviewed journal articles and more than 400 conference papers. He has received numerous awards, including the 2006 Blondel Medal from the French Association of Electrical Engineering, Electronics, Information Technology and Communication (SEE), the 2016 Berger Award from the International Conference on Lightning Protection, the Best Paper Award of the IEEE Transactions on EMC (2016 and 2018), and the Motohisa Kanda Award for the most cited paper of the IEEE Transactions on EMC (2012–2016 and 2014–2018). In recognition of his contributions, he was appointed Distinguished Honorary Professor at Tsinghua University in 2024 and Honorary Professor of Xi'an Jiaotong University, China, in 2014. In 2019, he became a member of the Academy of Sciences of Bologna Institute. He served as President of the Swiss National Committee of the International Union of Radio Science from 2012 to 2020, Vice-Chair of the European COST Action on the Physics of Lightning Flash and its Effects (2005–2009), Chairman of the 2008 European Electromagnetics International Symposium, and President of the International Conference on Lightning Protection (2008–2014). In editorial roles, he has been Deputy Editor-in-Chief of IET High Voltage (2016–present), Editor-in-Chief of IEEE Transactions on Electromagnetic Compatibility (2013–2015), and a member of its Advisory Board (2016–2021).