

## Commission E

Session	Title	Convener names & e-mails	Number of slots
E01	EMC in Complex Systems	Flavio Canavero, Pierre Degauque, flavio.canavero@polito.it, Pierre.Degauque@univ-lille1.fr	8
<p>The session addresses one of the central issues in electromagnetic compatibility and interference, namely the treatment of complexity. Complex systems consist of many interacting components participating to the EM interaction response. The complexity of a system increases with the number of distinct components, the sophistication of the components and their interactions. The scope of the session is to present works which focuses on modeling, simulation and experimental characterization of complex systems, the effects of ground on electromagnetic coupling phenomena and the coupling of electromagnetic waves through the structures.</p>			

Session	Title	Convener names & e-mails	Number of slots
E02	High-Power Electromagnetics and IEMI	Dave V. Giri, Robert L. Gardner, Robert.L.Gardner@verizon.net	6
<p>The sessions address intentional electromagnetic interference (IEMI), or the intentional malicious generation of electromagnetic energy introducing noise or signals into electric and electronic systems, thus disrupting, confusing or damaging these systems for criminal purposes or leverage in protective actions (ex: anti-drone neutralization system). The technical area of HPE consists of the physics and engineering associated with electromagnetic sources where nonlinear effects associated with high-field regions (and air breakdown) must be included in the analysis and design. This includes EMP simulators, high-power narrowband and mesoband, and hyperband (impulse) sources and antennas.</p>			

Session	Title	Convener names & e-mails	Number of slots
E03	Stochastic/Statistical Techniques in EMC	Luk Arnaut, Sergio Pignari l.arnaut@qmul.ac.uk, sergio.pignari@polimi.it	6

The EMC community is increasingly interested in the development of analysis and design techniques which take into account the random fluctuations and the inherent uncertainty of system parameters. In fact, the system response is affected by the statistics of parameters considered as random variables, and varies widely within a distribution. Typical areas of interest include effects due to unknown wave parameters of interfering signals, statistical nature of fields inside metallic enclosures, uncertainty in the location of conductors inside cable bundle structures and routing of bundles in metallic enclosures, values of termination impedances, values of stray parameters and material parameters, etc. The session will address these issues and give updated information on developments in EMC characterization and testing based on statistical analysis and design techniques.

Session	Title	Convener names & e-mails	Number of slots
E04	EMC in Wired and Wireless Systems	Virginie Deniau, Jacob Gavan, Yossi Pinhasi, Frank Gronwald, virginie.deniau@ifsttar.fr, gavan@hit.ac.il, yosip@ariel.ac.il, frank.gronwald@uni-siegen.de	5

EMC of communication systems, either wired or wireless, is of fundamental interest as it affects the quality of the transmission media as well as the electromagnetic environment for other technologies in the vicinity. The session addresses the propagation of signals and interference in wired and wireless systems and the analysis of the hardening of communication PHY and MAC layers to handle potential perturbations due the coupling of electromagnetic waves as well as the malfunction of RF transceiver close to cable networks. Used in civilian infrastructure wireless and wired technologies are also highly involved in critical infrastructures like SCADA/PLC systems. Thus, the understanding of such phenomena and the hardening of their infrastructure become highly required. This session includes works related to 5G.

Session	Title	Convener names & e-mails	Number of slots
E05	Lightning and Related Phenomena	Vladimir Rakov, Takeshi Morimoto rakov@ece.ufl.edu, morimoto@ele.kindai.ac.jp	5

The session addresses the characterization of terrestrial and planetary electromagnetic noise, as well as natural noise from terrestrial and extra-terrestrial sources with a view towards the interests of CCIR and the advancement of knowledge.

Session	Title	Convener names & e-mails	Number of slots
E06	EMC in Power Engineering	François Costa, William Radasky francois.costa@satie.ens-cachan.fr	5
<p>This session addresses the generation of high level electric and magnetic fields and conducted disturbances on the operation of ac and dc power transmission systems, radio interference aspects, and the ion current phenomena generated by dc transmission lines. In addition the impacts of fields and conducted transients on the electronics controlling the power grids (substation electronics and converter stations) are of interest, including methods to protect the electronics from these disturbances.</p>			

Session	Title	Convener names & e-mails	Number of slots
E07	Measurement Techniques	Carlo Carobbi, Christophe Lemoine, Ramiro Serra, carlo.carobbi@unifi.it, christophe.lemoine@insa-rennes.fr, r.serra@tue.nl	8
<p>The session addresses the raft of techniques that are involved in making electromagnetic compatibility measurements. The wide variety of available measurement techniques and the ever-increasing challenges faced by development and test engineers makes the measurement and analysis of EMC phenomena a significant discipline. The scope of the session is to contribute with original research work spanning the whole spectrum of measurement techniques.</p>			

Session	Title	Convener names & e-mails	Number of slots
E08	Geomagnetic Disturbances (GMD) and Effects	William Radasky, Edward Savage	5
<p>A geomagnetic storm is a temporary disturbance of the Earth's magnetosphere caused by a Coronal Mass Ejection (CME) or a Coronal Hole High Speed Stream (CHSS) from the Sun. The solar wind shock wave and/or a high speed stream of charged particles interacts with the Earth's magnetic field. The increase in the solar wind pressure initially compresses the magnetosphere, creating a Sudden Impulse (SI) disturbance that reaches the Earth's surface. The solar wind's magnetic field also interacts with the Earth's magnetic field and transfers charged particles into the lower ionosphere creating high levels of current flow that in turn causes fluctuating B-fields at the Earth's surface. These B-fields can induce significant currents into long conducting lines, such as power and communications lines, thereby affecting the operation of the related systems. Papers dealing with the creation of important geomagnetic disturbances (GMDs), the induced electric fields in the Earth and the effects on the critical infrastructures are invited.</p>			

Session	Title	Convener names & e-mails	Number of slots
E09	Time Reversal in Electromagnetics	Sébastien Lalléchère, Farhad Rachidi, Marcos Rubinstein, sebastien.lallechere@univ-bpclermont.fr, marcos.rubinstein@epfl.ch, farhad.rachidi@epfl.ch	6
<p>Time Reversal refers to the T-Symmetry invariance of many physical laws. If the the underlying physical equations of a physical system are time-reversal invariant, their solutions satisfy the governing equations both for positive and for negative time. The Time Reversal Technique, which is based on the time reversal invariance of acoustic and electromagnetic waves has been used in many applications, essentially by providing a high performance refocusing of radiated energy to the original radiation source point, to locate radiation points either experimentally or by simulation. The focus of this session is to discuss many aspects of time reversal method as applied to problems in electromagnetics.</p>			

Session	Title NEW	Convener names & e-mails	Number of slots
E10	Lightning and modelling of lighting effects in composite materials.	Isabelle Junqua, Farhad Rachidi, isabelle.junqua@onera.fr, farhad.rachidi@epfl.ch	6
<p>Lightning is one of the main natural sources of interferences. The use of sensitive electronics in avionics and wind generation systems, as well as the introduction of composite materials make it important to ensure adequate lightning protection of airplanes and wind turbines. The focus of this session is to discuss different aspects of lightning modeling and effects on composite materials.</p>			

Session	Title	Convener names & e-mails	Number of slots
E11	Machine learning and signal processing to analyze and mitigate EMI	Kevin Vinsen, Virginie Deniau, Kaushal Buch, kevin.vinsen@uwa.edu.au, virginie.deniau@ifsttar.fr, kdbuch@gmrt.ncra.tifr.res.in	6
<p>Contemporary techniques for characterizing and mitigating EM interference primarily use signal processing as their basis with machine learning now starting to appear in experimental systems. These tools have found use in the modeling and mitigating interference of different kinds, in a variety of systems. This session would cover the latest developments in the areas of machine learning, deep learning and signal processing for interference characterization, classification, and mitigation. The session also seeks papers on challenging applications where the use or the potential use of these techniques could significantly reduce the effects of interference.</p>			

Session	Title	Convener names & e-mails	Number of slots
E12	Issues in Wireless Power Transmission Systems	Jacob Gavan, Irit Juwiler, jacobg@sce.ac.il, iritj@sce.ac.il	6
<p>Wireless Power Transmission (WPT), called also Direct Energy (DE) systems, was proposed by Tesla in the beginning of the 20th Century as complement to radio communication and as an alternative to wired electrical power transmission, but the technology was not yet mature. Today, there are several operating WPT systems for civilian and military systems using microwave or laser. Many more are in the development stages. One of the most important obstacle in the development of WPT systems is the EMC limitations in sending wireless high power especially for long distances which require the cooperation of skilled EMC experts.</p> <p>In this session we shall deal with the analysis and development of EMI mitigation techniques for WPT systems to communication, RADAR or other wireless services, to the design and control of the wireless MW or Laser WPT beams to be safe, not to exceed power density limits dangerous to life while obtaining optimal power transfer efficiency from the input of the transmitter to the output of the receiver in WPT sub systems.</p>			

Session	Title	Convener names & e-mails	Number of slots
E13	Open session	F. Gronwald, V. Deniau, frank.gronwald@uni-siegen.de, virginie.deniau@ifsttar.fr	5
<p>This session will accept any papers falling within the terms of reference of Commission E and not covered elsewhere.</p>			