INTER-SOCIETY DISTINGUISHED LECTURER WORKSHOP

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Salón del Consejo Directivo
Facultad de Ingeniería, UBA

OPENING

Welcome Message

Prof. Alejandro Martínez (Dean FIUBA)

Event Introduction

Prof. Gustavo Fano – Prof. Ramón López La Valle – IEEE Student Branch of FIUBA

TECHNICAL PRESENTATIONS

From Engineering Electromagnetics to Electromagnetic Engineering: Teaching/Training Next Generations

Prof. Levent Sevgi (Istanbul Technical University, IEEE AP-S DLC Chair)

The role of Electromagnetic (EM) fields in our lives has been increasing. Communication, remote sensing, integrated command/ control/surveillance systems, intelligent transportation systems, medicine, environment, education, marketing, and defense are only a few areas where EM fields have critical importance. We have witnessed the transformation from Engineering Electromagnetics to Electromagnetic Engineering for the last few decades after being surrounded by EM waves everywhere. Among many others, EM engineering deals with broad range of problems from antenna design to EM scattering, indoor–outdoor radiowave propagation to wireless communication, radar systems to integrated surveillance, subsurface imaging to novel materials, EM compatibility to nano-systems, electroacoustic devices to electro-optical systems, etc. The range of the devices we use in our daily life has extended from DC up to Terahertz frequencies. We have had both large-scale (kilometers-wide) and small-scale (nanometers) EM systems. A large portion of these systems are broadband and digital and must operate in close proximity that results in severe EM interference problems. Engineers must take EM issues into account from the earliest possible design stages. This necessitates establishing an intelligent balance between strong mathematical background (theory), engineering experience (practice), and modeling and numerical computations (simulation).

This Distinguished/keynote lecture aims at a broad-brush look at current complex EM problems as well as certain teaching / training challenges that confront wave-oriented EM engineering in the 21st century, in a complex computer and technology-driven world with rapidly shifting societal and technical priorities.

Maritime Multi-Sensor Integrated Surveillance Systems Based on Surface Wave High Frequency Radars

Prof. Levent Sevgi (Istanbul Technical University, IEEE AP-S DLC Chair)

Countries with substantial coastal regions require greatly enhanced systems to monitor activity occurring within their Exclusive Economic Zones (EEZ). According to the United Nations Convention on the Law of the Sea (UNCLOS) of 1992, participating countries have extensive exploitation rights within the EEZ, which extends up to 200 nautical miles (nm) from shore. Activity will include isolated or grouped, moving and/or anchored surface targets and low-flying aircraft. The targets may be military/commercial, friend/foe, small/large. Besides the economic benefits, a participating country carries responsibilities such as prevention of smuggling, terrorism and piracy; the effective management and protection of offshore fisheries; search and rescue, vessel traffic services, pollutant control as well as meteorological and oceanographic data collection.

Traditional land-based microwave radars are limited to line-of-sight, which means a maximum range of 50-60km even with an elevated radar platform. The EEZ can be covered by microwave radar in a patrol aircraft, but requires three to five aircraft (well above 20,000ft) with many hours on station. Satellites have neither the spatial nor the temporal resolution to provide this surveillance in real-time. Sky wave high frequency (HF) radars can be used for this purpose, but they need large installations, are expensive and detection of surface targets is still limited. Optimum sensor for EEZ surveillance seems to be the Surface Wave HF radar.

This DL/Keynote talk is about modeling and simulation strategies and challenges in integrated maritime surveillance systems based on High Frequency Surface Wave Radars (HFSWR). Topics to be covered include fundamental radar concepts, HFSWR signal characteristics (signal, noise, clutter, interference, etc.), Surface wave propagation modeling and mixed-path effects, Transmit/Receive Antenna systems and beam forming/steering, Target reflectivity and RCS prediction/reduction, and Stochastic modeling.

Radar Developments in Argentina: Projects at INVAP S.A.U.

Prof. Roberto Costantini (INVAP S.A.U., Instituto Balseiro)

SPEAKERS' BIOS

Levent Sevgi is a Fellow of the IEEE (since 2009) and the recipient of IEEE APS Chen-To Tai Distinguished Educator Award (2021). He was with Istanbul Technical University (1991–1998), TUBITAK-MRC, Information Technologies Research Institute (1999–2000), Weber Research Institute / NY Polytechnic University (1988–1990), Scientific Research Group of Raytheon Systems Canada (1998 – 1999), Center for Defense Studies, ITUV-SAM (1993 –1998 and 2000–2002) and with University of Massachusetts, Lowell (UML) MA/USA as a full-time faculty (2012 – 2013), DOGUS University (2001-2014), Istanbul OKAN (2014 - 2021), and ATLAS (2022-2024) Universities.

He served four years (2020-2023) as an IEEE AP-S Distinguished Lecturer. Since Jan 2024 he has been the chair of the IEEE AP-S DL Committee. He served one-term in the IEEE AP-S AdCom (2013-2015) and one-term and as a member of IEEE AP-S Field Award Committee (2018-2019). He had been the writer/editor of the "Testing ourselves" Column in the IEEE AP Magazine (2007-2021), a member of the IEEE AP-S Education Committee (2006-2021), He also served in several editorial boards (EB) of other prestigious journals / magazines, such as the IEEE AP Magazine (2007-2021), Wiley's International Journal of RFMiCAE (2002-2018), and the IEEE Access (2017-2019 and 2020-2022). He is the founding chair of the EMC TURKIYE International Conferences (www.emcturkiye.org).

He has been involved with complex electromagnetic problems for nearly four decades. His research study has focused on electromagnetic radiation, propagation, scattering and diffraction; RCS prediction and reduction; EMC/EMI modelling, simulation, tests and measurements; multi-sensor integrated wide area surveillance systems; surface wave HF radars; analytical and numerical methods in electromagnetics; FDTD, TLM, FEM, SSPE, and MoM techniques and their applications; bio-electromagnetics. He is also interested in novel approaches in engineering education, teaching electromagnetics via virtual tools. He also teaches popular science lectures such as Science, Technology and Society.

He has published many books / book chapters in English and Turkish, over 180 journal/magazine papers / tutorials and attended more than 100 international conferences / symposiums. His three books Complex Electromagnetic Problems and Numerical Simulation Approaches, Electromagnetic Modeling and Simulation and Radiowave Propagation and Parabolic Equation Modeling were published by the IEEE Press - WILEY in 2003, 2014, and 2017, respectively. His fourth and fifth books, A Practical Guide to EMC Engineering (Sep 2017) and Diffraction Modeling and Simulation with MATLAB (Feb 2021) were published by ARTECH HOUSE.

His h-index is 38, with a record of 5200+ citations (source: Google Scholar, Feb 2025).

Roberto Costantini received the degree of Engineer in Telecommunications from Universidad Nacional de La Plata (Argentina) and DESS from Université de Paris 6 (France). After working with other companies in the development of communications systems and applications of signal processing, he joined the Aerospace Division of INVAP S.A.U. (Bariloche, Argentina). There he worked on the different radar projects of the company, being involved mainly in system engineering, development of RF electronics and signal processing algorithms, and engineering consulting. He is currently at the Radar, Defense & Security Division where he works as a senior expert in radar systems. His areas of activity include applied statistics, signal processing, electronic counter measures and sensor arrays.

Among others, he participated in the development of the following projects: SAOCOM (namely, in its satellite-borne L-band synthetic aperture radar), RSMA (secondary surveillance radars for air traffic control), RPA (primary long-range 3-D military radars), and SINARAME (weather polarimetric C-band Doppler radars).

Additionally, he is a part-time full professor at Instituto Balseiro (Universidad Nacional de Cuyo). He formerly held equivalent positions at Universidad Nacional de Rio Negro, Universidad de Buenos Aires and Universidad Nacional de La Plata.