



# 6th International Conference on Smart and Sustainable Technologies

**Bol and Split, Croatia  
(hybrid)**

**September 8-11, 2021**

Visit our website for more details  
<https://2021.splitech.org/>

**Tutorial:**

## **Engineering Models in Computational Electromagnetics (CEM)**

**Organizer: Dragan Poljak**

University of Split, FESB

Split, Croatia

Tutorial starts with some general aspects of computational electromagnetics and electromagnetic compatibility (EMC). The introduction also outlines some well-established analytical and numerical methods.

First, a crash-course on the theory of thin wire antennas will be presented and related numerical solution methods for various integral equations in both frequency and time domain will be presented. Computational examples include dipoles, Yagi-Uda arrays and logarithmic-periodic dipole antennas (LPDA). In particular, some recent applications to air traffic control and ground penetrating radar (GPR) will be discussed.

Next, full wave (antenna) models for various thin wire structures, from rather simple to realistic complex geometries, will be addressed. This will be followed by the analysis of overhead/belowground transmission lines. A trade-off between the use of rigorous full wave models and approximate transmission line (TL) approach will be emphasized with particular focus to PLC (Power Line Communications) configurations, lightning channel, realistic grounding systems for wind turbines.

Tutorial will also deal with the human exposure to electromagnetic fields. Low frequency, high frequency and transient exposures related to possible adverse health effects will be discussed addressing electromagnetic interference (EMI) sources such as power lines, transformer substations, wireless power transfer (WPT) base stations antennas for 2G/3G/4G and 5G sys

Technically co-sponsored by:



tems. Some biomedical application of electromagnetic fields, with particular emphasis on transcranial magnetic stimulation (TMS), transcranial electric stimulation (TES) and nerve fiber stimulation, will be also discussed.

Furthermore a stochastic approach (featuring the use of stochastic collocation (SC) technique) to analysis of GPR, grounding electrodes, human exposure to electromagnetic fields and biomedical application of electromagnetic fields will be outlined.

The presentation will end up with some topics in magnetohydrodynamics pertaining to the modeling of plasma physics phenomena pertaining to the applications in thermonuclear fusion.

Technically co-sponsored by:

## Biography



**Dragan Poljak** was born on 10 October 1965. He received his BSc in 1990, his MSc in 1994 and PhD in electrical engineering in 1996 from the University of Split, Croatia. He is the Full Professor at Department of Electronics, Faculty of electrical engineering, mechanical engineering and naval architecture at the University of Split, and he is also Member of Board of Directors of Wessex Institute of Technology. His research interests include frequency and time domain computational methods in electromagnetics with applications in electromagnetic compatibility, bioelectromagnetics and plasma physics. To date Professor Poljak has published few hundreds of journal

and conference papers in the area of computational electromagnetics, and authored/co-authored or edited number of books and book chapters published by WIT Press, Wiley and Elsevier, Professor Poljak is a member of IEEE, a member of the Editorial Board of the journal *Engineering Analysis with Boundary Elements*, Academic Editor of the journal *Mathematical Problems in Engineering* and Associate Editor of the journal *IET Science, Measurement & Technology*. He serves as a co-chairman of many WIT International Conferences. He is also editor of the WIT Press Book Series *Advances in Electrical Engineering and Electromagnetics*. In June 2004, professor Poljak was awarded by the National Prize for Science. In 2013 he was awarded by the Nikola Tesla Prize for achievements in Technical Sciences, in 2016. He received the prize for the achievements in engineering education from Croatian IEEE chapter and in 2017 he received the prize for science from the University of Split.

In July 2019 Prof Poljak received Technical Achievement Award by the IEEE Electromagnetic Compatibility Society for contributions to computational dosimetry for human exposure to electromagnetic fields.

From 2011 to 2015 professor Poljak was the Vice-dean for research at the Faculty of electrical engineering, mechanical engineering and naval architecture. In 2011 professor Poljak became a member of WIT Bord of Directors. In June 2013 professor Poljak became a member of the board of the Croatian Science Foundation.

Technically co-sponsored by: