



**"Gheorghe Asachi" Technical University of Iasi, Romania**



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## **EDITORIAL**

### **A SPECIAL ISSUE DEDICATED TO**

### ***ENVIRONMENTAL CONCERNS ON ELECTROMAGNETIC COMPATIBILITY AND ENGINEERING IN MEDICINE AND BIOLOGY***

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This special issue of *Environmental Engineering and Management Journal* is dedicated to interdisciplinary research and discusses multiple results addressing environmental issues in *Electromagnetic Compatibility (EMC)* and *Engineering in Medicine and Biology (EMB)* areas.

Some of the most significant research directions considered in this issue entail the electromagnetic pollution together with a survey of electromagnetic environment in order to analyze and quantify the biological and health effects of electromagnetic fields, biological signal changes in humans exposed to electromagnetic fields, interactions between electromagnetic fields and living mater, detection and measurements of bio-magnetic fields.

In October 2010 we organized the first *International Workshop in EMC and EMB* at the Faculty of Electrical Engineering of the *Gheorghe Asachi* Technical University of Iasi, Romania ([www.tuiasi.ro](http://www.tuiasi.ro)). The significant interest in this event encouraged us to organize the second edition of the *EMC and EMB Workshop* in October 2012.

The papers included in this special issue are related to the workshop topics, and are extended versions or new results from some of the active participants of the *EPE 2012 Conference*. The first group of papers is related to a special source of electromagnetic interference, namely the electrostatic discharge (*ESD*) phenomenon and deal with: *ESD* generator system, human body model, emission/susceptibility testing methods. Other very common electric/magnetic field sources are considered in following papers, presenting: a technique to mitigate the power frequency magnetic

field produced in its vicinity by the transport and distribution power lines; a theoretical investigation of the *ELF* magnetic fields produced by typical configurations of overhead power lines.

Another group of papers focuses on the optimal design in order to improve the efficiency of planar structures: improving the performance of the integrated electromagnetic interference filters or the design of spiral inductors/transformers, based on numerical analysis.

Several papers refer to the electromagnetic field measurement and human exposure assessment, while others tackle issues such as the field measurement in an electromagnetic unshielded environment or an analysis of three dimensional data generated using acquisition methods such as computed tomography or weather radar.

Some papers deal with the real-time processing of electrocardiography (ECG) signals in order to reduce electromagnetic interference effects (adaptive filtering on FPGA circuit, Wigner function), or the real-time monitoring of patients (monitoring of the heart rate and pacemaker parameters from a remote location).

Another significant group of papers is dedicated to biomedical signal monitoring for patients exposed to certain environmental factors. The recording and processing of electroencephalographic (EEG) and electrocardiography (ECG) signals are carried out for persons during magnetotherapy procedures, in order to identify potential changes of their biological signal due to magnetic field exposure.

We also included papers presenting wireless systems based on smart sensor nodes for indoor air quality and unobtrusive cardio-respiratory

monitoring; the goals consist in the estimation of the effect of air quality on the human organism and the characterization of the exposure to air pollutants.

In another case, several measurements were taken in order to analyze the short-term heart rate variation and the morphologic variability of electrocardiographic signals for detecting mental stress. Some authors carry out a prospective study on the identification of the environmental factors which cause and aggravate dysphonia in patients.

A few papers address the context of environmental factors which can influence the quality of atmosphere, water and the human health in the above-mentioned circumstances, applying specific tools for the characterization of the parameters taken in the analysis.

I am confident that such topics, backed up by important and novel results, will prove of interest to the readers of EEMJ, especially to those interested in interdisciplinary topics. The research directions and

outcomes presented in this issue offer multiple technologies which are easily transferable to the field of environmental engineering, considering that many of the techniques and topics from the various published papers deal with hazards, various types of pollution sources, and human health issues.

I would like to express my sincere thanks to Professor Matei Macoveanu, Editor-in-Chief and Professor Maria Gavrilescu, Managing Editor of the *Environmental Engineering and Management Journal*, for their support and interest in our field of research.

I am also grateful to all the authors who have submitted papers, for their unceasing efforts and availability and willingness to contribute to this issue of *Environmental Engineering and Management Journal*. We hope that this will lead to significant progresses in all related research and technical fields, as well as to further developments and new achievements in the EMC and EMB domains.

**Guest Editor:**

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**Valeriu David** received the Electrical Engineering (Electronics and Communications Section) degree at the *Gheorghe Asachi* Technical University of Iași, Romania in 1983 and the PhD degree in *Electrical Measurement* at the same University, in 1998.

He is professor and Ph D supervisor in the Department of Electrical Measurements and Materials, Faculty of Electrical Engineering - *Gheorghe Asachi* Technical University of Iași, having researches and teaching interest in: electric and electronic measurements; measurement in biomedicine and ecology; survey of the electromagnetic environment; biological effects of electromagnetic fields; new materials and techniques for electromagnetic shielding.

Profesor Valeriu David is author/coauthor in 10 books, over 130 scientific papers and he has been involved in about 20 national and international grants.