

THE 8TH INTERNATIONAL WORKSHOP
OF
ELECTROMAGNETIC COMPATIBILITY

CEM 2012

*Sibiu, ROMANIA
September, 27 – 29, 2012*

with support:



**Ministry of Education Research, Youth and Sports,
Romania**

Organized by:



**National Institute for Research and Development in
Electrical Engineering ICPE-CA, Bucharest, Romania**

in collaboration with



Romanian EMC Association










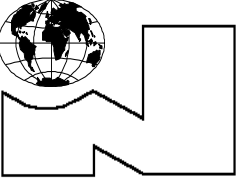
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Romanian Electrotechnical Committee



“Lucian Blaga” University” Sibiu, Romania

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Thursday

September 27, 2012

12:00 – 15:00 *Accommodation. Preliminary information*

15:00 – 16:00 *Registration of participants, Posters display - Hall Hotel Roberts*

16:00 – 16:15 **Opening Ceremony**

16:15 – 17:45 **Plenary Session, INVITED PAPERS**

17:45 – 18:45 **Round table**

18:45 – 19:00 **15 Years Activity of ACER**

19:00 – 20:00 **Exhibition**

20:00 – 21:00 **Cocktail**

Friday

September 28, 2012

08:30 – 11:00 **Plenary Session, INVITED PAPERS**

11:00 – 11:15 **Coffee/Tea Break**

11:15 – 13:00 **Oral Session**

13:00 – 14:00 **Lunch**

14:00 – 16:30 **Plenary Session, INVITED PAPERS**

16:30 – 16:45 **Coffee/Tea Break**

16:45 – 19:15 **Oral Session**

19:15 – 19:45 **Plenary Session, INVITED PAPER**

20:00 – 22:00 **Banquet**

Saturday

September 29, 2012

8:00 – 8:30 **Info day BISNET TRANSYLVANIA**

8:30 – 10:30 **Poster Debate**, Hall Hotel Roberts

10:30 – 11:00 *Closing remarks*

Award handing: “The best poster” and “The best communication at oral presentation session” for a junior participant

Workshop closing Ceremony, Hall Hotel Roberts

11:00 – 16:00 **Social program (trip)**

16:00 - 17:00 **Departure**

Thursday, September 27, 2012

Plenary Session

16:15 – 17:45

INVITED PAPERS, Conference Room

PRESIDENTS: Marcel OPRIS, Wilhelm KAPPEL

16:15 – 16:45

A REVIEW OF STUDIES ON HEALTH EFFECTS OF ELECTROMAGNETIC FIELDS

Michel IANOZ

Swiss Federal Institute of Technology of Lausanne, SWITZERLAND

16:45 – 17:15

HYBRID AND ELECTRICAL VEHICLE EMC TESTING GUIDELINES

Uwe FLOR

EM TEST GmbH, Kamen, GERMANY

17:15 – 17:45

A NEW THEORY REGARDING ABSORPTION AND REFLECTION LOSS IN FRAUNHOFER ZONE FOR CONDUCTIVE DIELECTRICS IN ORDER TO EXCEED THE INCONGRUITIES OF SCHELKUNOFF-SCHULZ ELECTROMAGNETIC ISOMORPHISM

Mihai BĂDIC

National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

17:45 – 18:45 Round table

Issues and trends on the harmonization of directives in the EMC. The issue of measurement uncertainty

Moderators: Dan RUCINSCHI and Mihai BĂDIC

18:45 – 19:00

15 Years Activity of ACER

Andrei MARINESCU

19:00 – 20:00 Exhibition

Friday, September 28, 2012

Plenary Session

08:30 – 11:00

INVITED PAPERS, Conference Room

PRESIDENTS: Jolanta KARPOWICZ, Gilbert DECAT

08:30 – 09:00

RADIATED EMISSIONS MEASUREMENTS FOR ESTABLISHING ELECTRICAL EQUIPMENTS ELECTROMAGNETIC PROFILES

Liviu COȘEREANU, Dan STOICA, Anca STOICA

Military Equipment and Technologies Research Agency, Clinceni, ROMANIA

09:00 – 09:30

CONSIDERATIONS ON TESTING OF THE SHIELDING EFFECTIVENESS FOR ENCLOSURES ELECTROMAGNETIC PROTECTED

Mircea POPESCU

The Special Telecommunications Service – STS, Bucharest, ROMANIA

09:30 – 10:00

INDUCTIVE CONTACTLESS POWER TRANSFER AND EMC/EMF ISSUES

Andrei MARINESCU

ICMET Research&Testing National Institute for Electrical Engineering, Craiova, ROMANIA, ACER Romanian EMC Association

10:00 – 10:30

ENERGY INFRASTRUCTURE PROTECTION AGAINST INTENTIONAL ELECTROMAGNETIC INTERFERENCE (IEMI) - ASPECTS OF STANDARDIZATION WORK

Dan Cristian RUCINSCHI

University POLITEHNICA of Bucharest, TICEM Center, ROMANIA

10:30 – 11:00

STATIONARY MAGNETIC FIELD GENERATED BY AN ELECTRIC CIRCUIT ON A CROSS-SECTION OF A SHIP

Gheorghe SAMOILESCU, Mircea CONSTANTINESCU, Adelina Rodica BORDIANU

“Mircea cel Bătrân” Naval Academy, Constanța, ROMANIA

11:00 – 11:15 Coffee & Tea

Oral Session

11:15 – 13:00

Conference Room

PRESIDENTS: Dina SIMUNIC, Liviu COȘEREANU

11:15 – 11:30

BIOELECTROMAGNETIC RESEARCHES AND SPECIAL ELECTROMAGNETIC COMPATIBILITY ISSUES

Octavian BALTAG, Doina COSTANDACHE, Miuța RĂU

University of Medicine and Pharmacy “Grigore T. Popa” Iasi, Faculty of Medical Bioengineering, Iasi, ROMANIA

11:30 – 11:45

STANDARDS ON SHORT-CIRCUIT CURRENTS IN MARINE POWER PLANTS

Serghei RADU¹, Gheorghe SAMOILESCU², Georgiana MARIN³

¹ZODIAC Company, ²“Mircea cel Bătrân” Naval Academy, Constanța, ROMANIA, ²Navy Research Center, ROMANIA, ROMANIA, ³“Nicolae Balcescu” Land Forces Academy, Sibiu, ROMANIA

11:45 – 12:00

A PARAMETRIC STUDY OF THE LUMPED, CIRCUIT PARAMETERS OF A MINIATURE SPIRAL PLANAR TRANSFORMER

J.B. DUMITRU¹, A. M. MOREGA^{1,2}, L. PÎSLARU-DĂNESCU³, M. MOREGA¹

¹ University POLITEHNICA of Bucharest, ² “Gh. Mihoc – C. Iacob” Institute of Statistical Mathematics and Applied Mathematics, Romanian Academy, ³ The National Institute for Electrical Engineering, ICPE-CA, Bucharest, ROMANIA

12:00 – 12:15

EVALUATION OF EXPOSURE OF OPERATORS OF MAGNETIC RESONANCE SCANNERS TO STATIC MAGNETIC FIELD

Jolanta KARPOWICZ

Central Institute for Labour Protection – National Research Institute (CIOP-PIB), Laboratory of Electromagnetic Hazards, Warszawa, POLAND

12:15 – 12:30

OCCUPATIONAL EXPOSURE TO VHF BAND RADIOFREQUENCY RADIATION IN THE IN THE NEAR-FIELD OF ANTENNAS USED IN MILITARY COMMUNICATIONS

Mircea STĂNIC, Simona MICLEAȘ, Paul BECHET

„Nicolae Balcescu” Land Forces Academy, Sibiu, ROMANIA

12:30 – 12:45

**INVESTIGATING - ASSESSING THE ELECTROMAGNETIC
COMPATIBILITY INTO CAPABILITY DIAGRAM AT ONE HPP-
STORING ENERGY, USING VARIABLE DRIVINGS**

**Basarab GUZUN, Elena ANGHEL, Julian BĂRBOIANU, Constantina GROFU,
Răzvan NEAGOE**

Politehnica University of Bucharest, Faculty of Energetic, Bucharest, ROMANIA

12:45 – 13:00

**EMC ISSUES RELATED TO H-FIELD RADIATED BY ESD IN THE
PROXIMITY OF APPLIANCES AND ELECTRONICS**

Oana BENIUGĂ¹, Mihai BENIUGĂ¹, Karol KOVÁČ²

¹Electrical Engineering Faculty, Technical University “Gheorghe Asachi” of Iasi, ROMANIA,

²Institute of Electrical Engineering, Slovak University of Technology, Bratislava, SLOVAK
REPUBLIC

13:00 – 14:00 Lunch

Plenary Session

14:00 – 16:30

INVITED PAPERS, Conference Room

PRESIDENTS: Michel IANOZ, Andrei MARINESCU

14:00 - 14:30

LONG-TERM EXPOSURE TO MOBILE COMMUNICATION RADIATION: AN ANALYSIS OF TIME-VARIABILITY OF ELECTRIC FIELD LEVEL IN GSM900 DOWNLINK CHANNELS

Simona MICLĂUȘ, Paul BECHET, Marius GHEORGHEVICI

„Nicolae Balcescu” Land Forces Academy, Sibiu, Romania

14:30 – 15:00

EXPOSURE ASSESSMENT OF THE 2.5/5 GHZ WI-FI DUAL BAND RADIATION IN A CITY IN BELGIUM

Gilbert DECAT

GD-EMF-Consulting, BELGIUM

15:00 - 15:30

FREQUENCY SELECTIVE EVALUATION OF RADIOFREQUENCY ELECTROMAGNETIC EXPOSURE CHARACTERISTIC IN OFFICE ROOMS LOCATED IN VARIOUS REGIONS OF POLAND

Jolanta KARPOWICZ, Krzysztof GRYZ, Wiesław LESZKO, Patryk ZRADZINSKI

Central Institute for Labour Protection – National Research Institute (CIOP-PIB), Laboratory of Electromagnetic Hazards, Warszawa, POLAND

15:30 - 16:00

RADIATED FIELD IMMUNITY TESTS - STANDARDS AND PRACTICAL ASPECTS

Eugen COCA, Adrian GRAUR

“Stefan Cel Mare” University of Suceava, ROMANIA

16:00 - 16:30

IMPROVING STANDARDIZATION PROCESS OF INTERNATIONAL INTERLABORATORY ELECTROMAGNETIC FIELD HUMAN EXPOSURE MEASUREMENTS

Dina SIMUNIC, Jolanta KARPOWICZ*

Dept. for Wireless Communications, Faculty of Electrical Engineering and Computing, University of Zagreb, CROATIA, *Laboratory of Electromagnetic Hazards, Central Institute for Labour Protection - National Research Institute, Warszawa, POLAND

16:30 - 16:45 Coffee & Tea

Oral Session

16:45 – 19:30

Conference Room

PRESIDENTS: Simona MICLĂUȘ, Florin Teodor TĂNĂSESCU

16:45 – 17:00

SIMULATION AND ANALYSIS OF EMISSIONS FROM A SWITCHED MODE POWER SUPPLY AND METHODS OF REDUCING THEIR

Petre-Marian NICOLAE, Marius VOINEA

University of Craiova, Faculty of Electrical Engineering, Electrical Engineering, Energetics and Aeronautics Dept., Craiova, ROMANIA

17:00 – 17:15

AROUND THE CONCEPT OF ELECTROMAGNETIC FIELDS IN SCHOOL HABITATS

Aurel-Dan MUȘEȚ

University of Oradea, ROMANIA

17:15 – 17:30

THE RADIO FREQUENCY SYSTEM DEDICATED TO THE STUDY OF CARBON NANOTUBES BEHAVIOUR

D.PANȚIȘ^{1,2,3}, M.BORDA¹

1- Technical University Cluj Napoca, 2- ROMATSA, 3 - Science Biocreative, Bucharest, ROMANIA

17:30 – 17:45

MATERIALS FOR THE NAVAL ELECTROMAGNETIC SHIELDS

Vasile DOBREF, Mircea CONSTANTINESCU, Alexandru SOTIR, Octavian TARABUTA

“Mircea cel Bătrân” Naval Academy, Constanța, ROMANIA

17:45 – 18:00

POWER FACTOR CORRECTION AND HARMONIC MITIGATION OF ADJUSTABLE SPEED DRIVES

Mihai DELIU, Alexandru HEDEȘ*, Nicolae MUNTEAN*

BeeSpeed Automatizari Ltd. Timisoara, *Politehnica University of Timisoara, ROMANIA

18:00 – 18:15

MEASURING THE EXPOSURE LEVEL OF THE HUMAN BODY TO RADIOFREQUENCY FIELDS FROM MULTIPLE SOURCES

Virgil LUCANU, Petre VOICU, Cosmin SMETANA, Liviu COȘEREANU
Military Equipment and Technologies Research Agency, Clinceni, ROMANIA

18:15 – 18:30

STUDY REGARDING THE OPTIMISATION OF INTERFERENCES IN A VHF NETWORK

Edmond MOLDOVAN, Paul BECHET, Simona MICLĂUȘ
„Nicolae Balcescu” Land Forces Academy, Sibiu, ROMANIA

18:30 – 18:45

THE MATHEMATICAL MODEL AND DATA ACQUISITION OF AN UNDERWATER EXPLOSION

Nicolae BĂDĂRĂ, Vasile DOBREF, Ovidiu Cristea, Octavian TARABUTA
“Mircea cel Bătrân” Naval Academy, Constanța, ROMANIA

18:45 – 19:00

FETAL ECG DETECTION USING RECURRENCE PLOT ANALYSIS

Elif Tuba CELIK¹, Angela DIGULESCU², Bogdan Hurezeanu¹
¹Polytechnic University of Bucharest, ²Military Technical Academy, Bucharest, ROMANIA

19:00 – 19:15

LYMFOCYTE- MACROPHAGE INTERACTION IN THE EXPERIMENTAL EXPOSURE TO ELECTROMAGNETIC FIELDS. A POSSIBLE PROTECTIVE EFFECT OF THE GEMOTHERAPIC PRODUCT, PRUNUS PERSECA

Didi SURCEL¹, S.TOADER², M. SURCEL², Mioara BUTAN³, Simona NITU⁴, Carmen PONORAN⁴

¹Blue Life Medical Center, Cluj-Napoca, ²University of Medicine and Pharmacy Cluj-Napoca, ³Center of Public Health, Cluj-Napoca, ⁴Plant Extract Cluj-Napoca, ROMANIA

19:15 – 19:45

INVITED PAPERS, Conference Room

THE ELECTROMAGNETIC POLLUTION OF THE ENVIRONMENT – ONE OF THE BIGGEST CHALLENGES OF HUMANITY IN THE 21TH CENTURY

Iosif LINGVAY

National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

20:00 – 22:00 Banquet

Saturday, September 29, 2012

08:00 – 11:00

Conference Room

08:00 – 8:30

Info day BISNET TRANSYLVANIA - SUPPORT NETWORK OF BUSINESS AND INNOVATION FOR SMEs IN TRANSYLVANIA

Georgeta ALECU

National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

08:30 – 10:30

Poster Session

PRESIDENTS: Gheorghe SAMOILESCU, Georgeta ALECU

CHARACTERIZATION OF THE MICROWAVES LEVELS IN THE PROXIMITY OF ONE SCIENTIFIC MICROWAVES POWER EXPERIMENTAL SETUP FOR THE USER BIOLOGICAL PROTECTION PURPOSE

Emanoil SURDUCAN¹, Vasile SURDUCAN¹, Camelia NEAMȚU¹, Angela LIMARE², Dana DABALĂ³

¹National Institute for Research and Development of Isotopic and Molecular Technologies (INCDTIM), ROMANIA, ²L'Institut de Physique du Globe de Paris (IPGP), FRANCE, ³Railways Medical Clinic CLUJ NAPOCA, Occupational Medicine Department, ROMANIA

EVALUATION OF UNCERTANTY COMPONENT IN ASSESSING EXPOSURE TO NON-UNIFORM LOW FREQUENCY MAGNETIC FIELD CAUSED BY THE USE OF VARIOUS TYPES OF MAGNETIC FIELD PROBES

Jolanta KARPOWICZ, Patryk ZRADZIŃSKI, Krzysztof GRYZ

Central Institute for Labour Protection – National Research Institute (CIOP-PIB), Laboratory of Electromagnetic Hazards, Warszawa, POLAND

NEW COMPOSITE TEXTILE FABRIC USED IN ELECTROMAGNETIC FIELD SHIELDING

Florina RĂDULESCU, Mirela CODESCU, Eros PĂTROI, Eugen MANTA, Alexandru IORGA

National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

3D REPRESENTATIONS OF THE NOISE IN A PCB BASED ON THE SELF AND TRANSFER IMPEDANCES OF THE POWER AND GROUND PLANES

R. FIZEȘAN

Applied Electronics Department of Technical University of Cluj-Napoca, ROMANIA

FIRST AND SECOND ORDER SQUID GRADIOMETER DESTINED TO OPERATE IN UNSHIELDED ELECTROMAGNETIC ENVIRONMENT

Miuța RĂU, Octavian BALTAG

University of Medicine and Pharmacy "Grigore T. Popa" Iasi, Faculty of Medical Bioengineering, ROMANIA

BIOLOGICAL EFFECTS IN LONG-TIME EXPOSURE TO EMF. CORRELATIONS AND INTERFERENCE IN EXPERIMENTAL AND CLINICAL STUDIES.

Dana DABALĂ¹, M.GLIGAN¹, D. SURCEL², E. SURDUCAN³, V.SURDUCAN³, S.MICLĂUȘ⁴

¹Railways Medical Clinic Cluj-Napoca, Occupational Medicine Department, ²"Blue Life" Medical Centre, Cluj-Napoca, ³National Institute for Research and Development of Isotopic and Molecular Technologies, Cluj-Napoca, ⁴"Land Forces" Academy, Sibiu, ROMANIA

COMMUNICATION CABLE IMMUNITY TO ELECTROSTATIC DISCHARGES

Beatrice MOAȘA, Elena HELEREA

Transilvania University of Brasov, Electrical Engineering and Computer Science Faculty, Research Center of Advanced Electrical Systems, Brasov, ROMANIA

APPLICATION ORIENTED LINE FILTERS FOR SUPPRESSING COMMUTATION DISTURBANCES

Claudia Camelia SZAKATS, Adrian Marian MAȚOI

Transilvania University of Brasov, ROMANIA

ELECTRICAL EQUIPMENT TESTING TO DEFORMING REGIMES

Ionel LEPĂDAT, Elena HELEREA, Nicolai STANCIU, Anca CIOBANU

Transilvania University of Brasov, Faculty of Electrical Engineering and Computer Science, Research Center of Advanced Electrical System, Brasov, ROMANIA

COOPER PLATED TEXTILE FOR EMIS APPLICATION

Nicolae STANCU, Ioana ION, Magdalena LUNGU, Ion DOBRIN, Violeta TSAKIRIS, Mariana LUCACI, Alexandra BRĂTULESCU, Cristian MORARI, Ionuț BĂLAN

National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

DIAMOND ON OXIDE NANOTRANSISTOR WITH HIGH PERFORMANCES SUITABLE FOR GIGA-HERTZ OPERATION

Cristian RAVARIU, Georgeta ALECU

"Politehnica" University of Bucharest, Faculty of Electronics, National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

SWITCHING POWER SUPPLY IMMUNITY TO RF DISTURBANCES

Corneliu URSACHI, Elena HELEREA

Transilvania University of Brasov, Electrical Engineering and Computer Science College, Advanced Electrical Systems Research Center, Brasov, ROMANIA

CAPACITIVE COUPLING INTERFERENCE PHENOMENA ON THE SURFACE OF PCB'S

Alina Elena RADU

Politehnica University of Bucharest, ROMANIA

CURRENT ASPECTS AND TRENDS IN STANDARDIZATION, WITH REFERENCE TO GENERAL EXPOSURE IN NEAR FIELD ELECTROMAGNETIC RADIATION

Jana PINTEA¹, Andrei MARINESCU², Mihaela MOREGA³

(1) National Institute for R&D in Electrical Engineering ICPE-CA, (2) Romanian EMC Association, ICMET Craiova, (3) University POLITEHNICA of Bucharest, ROMANIA

CELL PHONE AND HUMAN HEALTH

Andreea VOINA^{*}, Georgeta ALECU^{*}, Brândușa PANTELIMON^{}**

^{*}National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ^{**}Politehnica University of Bucharest, Faculty of Electrical Engineering, ROMANIA

INDUCTIVE COUPLING INTERFERENCE PHENOMENA ON THE SURFACE OF PCB'S

Roxana ROȘCA

Politehnica University of Bucharest, ROMANIA

ELECTRONIC CONTROL MODULE DESIGN FOR ELECTROMAGNETIC COMPATIBILITY

B. MIHĂILESCU, P. SVASTA

Centre for Technological Electronics and Interconnection Techniques, Politehnica University of Bucharest, Bucharest, ROMANIA

SELECTIVE SHIELDING PROPERTIES OF MULTILAYERED GLASS COATED AMORPHOUS WIRES

G. ABABEI, H. CHIRIAC

National Institute of Research & Development for Technical Physics, Iasi, ROMANIA

THEORETICAL BACKGROUND AND EXPERIMENTAL DETERMINATION OF THE GAIN OF PYRAMIDAL HORN ANTENNAS

Cristian MORARI, Ionuț BĂLAN, Mihai BĂDIC

^{*}National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

SHIELDING MATERIAL CHARACTERIZATION USING TWO DIFFERENT METHODS

Ionuț BĂLAN, Cristian MORARI, Mihai BĂDIC, Jana PINTEA

^{*}National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

10:30 – 11:00 *Closing remarks*

Award handing: “The best poster” and “The best communication at oral presentation session” for a junior participant

Awarding Committee:

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Ph.D. Gilbert DECAT

Comandant Dr. Liviu COȘEREAU

Prof.Ph.D. Michel IANOZ

Ph.D. Jolanta KARPOWICZ

Workshop closing Ceremony, Hall Hotel Roberts

11:00 – 16:00 Social program (trip)

16:00 - 17:00 Departure

ABSTRACTS

1. A REVIEW OF STUDIES ON HEALTH EFFECTS OF ELECTROMAGNETIC FIELDS

Michel IANOZ

Swiss Federal Institute of Technology of Lausanne, SWITZERLAND

Abstract

The health effects of Electromagnetic fields have been extensively studied in the last 30 years. The paper will present the main sources of fields which have been considered as potentially harmful for human health. Even if an electro-sensitivity for certain persons can not be denied, epidemiological and experimental studies on plants, animals and humans could not put into evidence a clear effect of such fields, at levels of intensity to which people are submitted in the each day life. The standards written to fix limits for the fields on international level will be shortly presented and discussed.

2. HYBRID AND ELECTRICAL VEHICLE EMC TESTING GUIDELINES

Uwe FLOR

EM TEST GmbH, Kamen, GERMANY

Abstract

The introduction of electrical vehicles and hybrid electrical vehicles (EVs/HEVs) has resulted in an increase of testing demands from automotive manufacturers. The fact that many such vehicles are powered by connecting directly to an external power station, now means that Electrical Vehicle manufacturers need to meet standard testing requirements outside the traditional transient automotive testing range (ISO 7637-2). This is a great challenge for such manufacturers. Due to the close cooperation between EM TEST and the global car manufacturers this tutorial could inform you on the most important news in regard to:

- Comparison between the EMC requirements according to ECE Regulation 10, Annex 17-22 and the product standard IEC 61851-21 Ed. 2.0 Part 21 (Requirements for Electric vehicles for conductive connection die an AC/DC supply)
- The new test methods of the ECE R10 according to annex 17 to 22 are focused on "RESS charging mode coupled to the power grid" including:
- Methods of testing for immunity of electrical/electronic sub-assemblies (ESA) to electrical fast transient/burst disturbances conducted along AC and DC power lines
- Methods of testing for immunity of electrical/electronic sub-assemblies (ESA) to Surges conducted along AC and DC power lines
- Methods of testing for emission of harmonics generated on AC power lines of electrical/electronic sub-assemblies(ESA)
- Methods of testing for emission of voltage changes, voltage fluctuations and flicker on AC power lines of electrical/electronic sub-assemblies (ESA)
- Testing of Electrostatic discharge (ESD) according to ISO 10605:2008
- What are the new requirements for cars and components caused by the connection to the public mains supply 230V/400V during charging
- What are the consequences for car manufacturers and sub-suppliers
- What are the differences between tests outside the vehicle (charging stations) and inside the vehicle

3. A NEW THEORY REGARDING ABSORPTION AND REFLECTION LOSS IN FRAUNHOFER ZONE FOR CONDUCTIVE DIELECTRICS IN ORDER TO EXCEED THE INCONGRUITIES OF SCHELKUNOFF-SCHULZ ELECTROMAGNETIC ISOMORPHISM

Mihai BĂDIC

National Institute for Research and Development in Electrical Engineering ICPE-CA, Bucharest, ROMANIA

Abstract

The paper deals with one of the most used and reliable ways to characterize the shielding capability of materials, based on the Schelkunoff-Schulz isomorphism.

This method uses the physical-mathematical equivalence of equations describing SE_{dB} in the case of infinite plane shield, respectively in the case of material sample introduced in the measuring coaxial TEM cell (IA_{dB}), and it resulted into the ASTM standards ES 7-83 and D 4935-89.

The paper shows that this standards and consequently Schelkunoff isomorphism are not valid for electrically thick samples; there is no identity between shielding effectiveness and insertion attenuation/insertion loss in HF range.

The paper is referring to theoretical and experimental method in order to demonstrate the inconsistency of the mathematical isomorphism (infinite plane shield vs. coaxial transmission line) in the area of electrically thick samples. Even if it is formally accurate, it has not been experimentally validated up to now, according to many works in the field; authors intend to prove that Schelkunoff theory contains basic errors when applied to electrically thick samples.

4. 15 Years Activity of ACER

Andrei MARINESCU

ACER Romanian EMC Association

Abstract

Romanian Association for Electromagnetic Compatibility (ACER) was founded in 1997 as an NGO with professional character to meet the requirements of European integration of Romania at only one year of implementation of the first European Directive 89/336/EC regarding EMC.

The group of founding members foresaw the need for connection of existing concerns in the universities and research institutes in Romania to the European institutional framework regarding both the protection of the public and professionals against the effects of electromagnetic radiations, but also the need to create testing laboratories that can certify the modern products made in the country or imported regarding the basic requirements foreseen in the standards.

The paper presents the main milestones of ACER activity that included both translation and implementation of standards and prescriptions of the European bodies and the participation in the development of Romanian normatives, technical documents and legislative proposals to promote them to the appropriate relevant authorities.

Organizing and participating in national and international congresses, symposia and workshops that regard the electromagnetic compatibility and related fields in many cities and centers of interest of the country and inviting of foreign specialists at these events were and are one constant activity of ACER.

On the anniversary of 15 years of activity, ACER presents itself as a successful professional association known both in the country and abroad that supports the professional initiatives and the development of Romanian economy.

5. RADIATED EMISSIONS MEASUREMENTS FOR ESTABLISHING ELECTRICAL EQUIPMENTS ELECTROMAGNETIC PROFILES

Liviu COȘEREANU, Dan STOICA, Anca STOICA

Military Equipment and Technologies Research Agency, Clinceni, ROMANIA

Abstract

The purpose of this paper is to present some results obtained in our specialized EMC laboratory about recognition of electrical equipments based on their electromagnetic profile. We conducted EMC tests for different class IT equipments using standard measurements procedures. Electromagnetic emissions profiles contain data about frequency spectrum distribution and time domain parameters. In order to reach our goals specialized software was available for spectrum analysis and modulation classification. We aim to create an extended electromagnetic emissions profiles database for different classes of unintentional emissive equipments. The results could be used in both civilian and military applications like monitoring, surveillance and recognition.

6. CONSIDERATIONS ON TESTING OF THE SHIELDING EFFECTIVENESS FOR ENCLOSURES ELECTROMAGNETIC PROTECTED

Mircea POPESCU

The Special Telecommunications Service – STS, Bucharest, ROMANIA

Abstract

To ensure that the shielded enclosure corresponds with the proposed purpose is important that its evaluation is carried out correctly by using a specific procedure. Since the screen penetrations are vulnerable, and not basic shielding material, must be assessed all joints and penetrations enclosure.

During performance enclosure are recommended two types of tests. Preliminary test must contain sufficient measurement points to ensure that the enclosure is electromagnetic sealed and can move on to finishing.

The final test is made for the certification of enclosure or as acceptance test. The paper presents practical aspects encountered in the evaluation of shielded enclosures.

7. INDUCTIVE CONTACTLESS POWER TRANSFER AND EMC/EMF ISSUES

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Abstract

Contactless power transfer devices in the near field becomes more and more widespread, especially for low powers necessary to charge the batteries of mobile terminals, MP3 Players and tablets / PC's. A recent statistics shows that at the end of 2011 there were approx. 18 million of such devices worldwide. Despite until now there is in Romania a little number of similar devices, the electromagnetic compatibility issues related to the operation of these ones concern the professionals working in the field.

In the first part of this paper it shows the principles of contactless power transfer through electric, magnetic or electromagnetic fields, the two firsts having a wide spreading as usual devices. In the case of inductive transmission there are questions related to the magnetic leakage fields which are carriers of energy losses and electromagnetic radiation which can affect the health of users as well as the operation of other devices from the neighbourhood.

Further on it analyses the applicability of existing standards for the qualification of these new devices, namely:

- if these ones can be considered high frequency transformers and consequently they must be treated in accordance with the EMC Directive 40/2004/EC and respectively EN 55011 standard or
- if these ones can be considered an Inductive Loop System and consequently they must be treated in accordance with the R & TTE Directive and tested in accordance with EN 300330 standard.

Finally it shows some aspects related to the application of ICNIRP Guidelines and the actions undertaken by the companies manufacturing wireless devices (Witricity and Alliance for Wireless Power) with a view to the qualification of these devices.

8. ENERGY INFRASTRUCTURE PROTECTION AGAINST INTENTIONAL ELECTROMAGNETIC INTERFERENCE (IEMI) - ASPECTS OF STANDARDIZATION WORK

Dan RUCINSCHI

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Abstract

Security of critical infrastructure, particularly energy infrastructure can be seriously affected by the lack of adequate protection against electromagnetic interference. For more than ten years subject began to be discussed and analyzed both to EMC conferences and in various professional and standardization organizations with electromagnetic compatibility concerns.

It soon came to the conclusion that EMC principles should be applied not only to apparatus, equipment and electrical, electronics and telecommunications systems but also extended and distributed systems with large physical dimensions.

It was thus defined a special concept called "Intentional Electromagnetic Interference" (IEMI) to better describe the production processes of the operation degradation or damage of these large systems. As an immediate consequence, the attention of various bodies has focused on studying of IEMI closely related to critical infrastructure, as network components of generation, transmission and distribution of electricity or telecommunications systems.

The paper aims to summarize IEMI potential threats, also protection and testing methods as theirs result from the documents prepared by IEC SC 77C subcommittee. It also presents elements of the work program of this subcommittee, to fulfill the task of providing security systems that are part of critical infrastructure.

9. STATIONARY MAGNETIC FIELD GENERATED BY AN ELECTRIC CIRCUIT ON A CROSS-SECTION OF A SHIP

Gheorghe SAMOILESCU, Mircea CONSTANTINESCU, Adelina Rodica BORDIANU

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Abstract

To ensure the protection of a ship against mine fields, provided with magnetic channel, expensive technological and research efforts must be made in order to reduce the values of the magnetic field generated by the ship – compensated winding assembly in a safety plan. The novelty aspect in the magnetic field calculation consists in adopting the shape of the electric circuit according to the initial design plan of the hull.

10. BIOELECTROMAGNETIC RESEARCHES AND SPECIAL ELECTROMAGNETIC COMPATIBILITY ISSUES

Octavian BALTAG, Doina COSTANDACHE, Miuța RĂU

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Abstract

The bioelectromagnetism as an integrative discipline of bioelectricity and biomagnetism studies the electromagnetic fields in living systems: electric, magnetic and electromagnetic fields. The most important fields for medical applications are:

- biomagnetic fields of pT intensity and (0-500) Hz frequency range, explored by biomagnetometry,
- very low energy electromagnetic radiation corresponding to thermal radiation in the microwave range

The paper presents the installation components consisting of a nonferromagnetic shielded room, lined inside by microwave absorbent material with pyramidal geometry and a complex triaxial coils system to control the ambient magnetic fields: geomagnetic components and those due natural variations, the fields produced by human activity - the movement of masses of metal, vehicles, magnetic field of 50 Hz etc.

The installation permits the detection the magnetic activity of the heart (magnetocardiogram – MCG) and the measurement of the internal temperature of living structures (microwave radiometry). This is an application for non-invasive early breast cancer detection. Performances of the installation are presented.

11. STANDARDS ON SHORT-CIRCUIT CURRENTS IN MARINE POWER PLANTS

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Abstract

Short circuits in marine power plants are phenomena which, due to short lengths of circuits, affect electrical equipment.

The calculation of short circuit currents and their taking into account starting from the design and continuing with the operation of equipment and naval installations, ensure their reliability and optimization.

Based on industry standard data, the paper analyzes the management of a ship power system aimed at short-circuit current calculation and the presentation of the software tool for this analysis.

Knowing the values of short circuit currents allows solving the following problems: design and performance of the protection system and its adjustment; the calculation of the electrodynamic force acting on current routes; selecting appliances and electrical equipment in marine power system depending on power, dynamic and thermal stability; the choice of current restricting devices; determining the maximum power of generators according to their operation and switching capacity of automatic circuit breakers; design and development of the single-line distribution diagram of naval power.

12. A PARAMETRIC STUDY OF THE LUMPED, CIRCUIT PARAMETERS OF A MINIATURE SPIRAL PLANAR TRANSFORMER

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Abstract

In many applications the chip-embedded core of miniature devices is a planar spiral transformer (MPST) with micro-structured windings. Its role is either to convert the electrical power providing a variable voltage output for driving multiple loads, or galvanic separation. The planar structure improves the cooling characteristics while providing the device a low profile.

This paper presents mathematical models and numerical simulation, finite element results for a notional miniature, planar, spiral transformer (MPST) fabricated in MEMS technology, for galvanic separation. The electromagnetic analysis is used to extract the lumped, circuit parameters of the MPST. Numerical simulation is used here to size the ferrite core. The lumped parameters of the MPST were computed using 2D and 3D models, and the results are compared.

The results may be of interest in dimensioning the electrical, equivalent scheme of the device that uses the MPST and in analyzing its electromagnetic compatibility with interfering working environment.

13. EVALUATION OF EXPOSURE OF OPERATORS OF MAGNETIC RESONANCE SCANNERS TO STATIC MAGNETIC FIELD

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Abstract

Key words: radiographer, nurse, occupational exposure, electromagnetic fields, exposimetry
Magnetic resonance scanners (MRI) are medical devices for imaging diagnostic, which involve patient's exposure to static magnetic fields (SMF) and time-varying electromagnetic fields. The preparation and performance of examination involve also workers exposure to SMF. Measurements of spatial distribution of SMF in the vicinity of MRI magnets and workers exposure (individual exposimetric profiles characterized by statistical parameters of magnetic flux density affecting worker) were performed. In routine examination of one patient the operator is present app. 1.5-7minutes in SMF >0.5mT, and exposure to SMF >70mT lasts only a small fraction of that time. When patients need more attention the exposure may be significantly longer. The SMF exposure in the vicinity of various MRI magnets depends on both magnetic flux density of main field (applicable to patient) and construction of particular devices, in the result operator (radiographer or nurse) exposure may vary from less than 10% of main field up to the main field level.

Acknowledgments: This work has been carried out within the second stage of the National Programme "Improvement of safety and working conditions" partly supported in 2011–2013 within the scope of research and development — by the Ministry of Science and Higher Education/National Centre for Research and Development.

14. OCCUPATIONAL EXPOSURE TO VHF BAND RADIOFREQUENCY RADIATION IN THE IN THE NEAR-FIELD OF ANTENNAS USED IN MILITARY COMMUNICATIONS

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Abstract

Reactive and radiative near-fields are important to be measured in connection with occupational human exposure. Both electric (E) and magnetic (H) field components need to be evaluated and they are to be compared against the occupational safety limits. The need for a proper device and a correct procedure for such measurements are crucial. Present work focused on exposure assessment very near to VHF radiofrequency sources (portable communication devices) by using a personal exposimeter - RADMAN model, enabled with both E- and H- field sensors. Data collection was made second by second, in various communication scenarios and at few emission power levels. The distribution of the field level around antennas during transmission was represented and conclusions on effect of human proximity are given. Generally, the exposure level decreases very fast with distance from the source and distances for occupational safety limit are indicated in each case.

15. INVESTIGATING - ASSESSING THE ELECTROMAGNETIC COMPATIBILITY INTO CAPABILITY DIAGRAM AT ONE HPP- STORING ENERGY, USING VARIABLE DRIVINGS

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Abstract

Key words: frequency converter, soft starter, electromagnetic compatibility EMC.

This investigation underlines some outstanding advantages balanced by certain drawbacks when the power electronics are to be introduced on a larger scale into the electric power plants domain, in particular into the Hydro Electric Power Plants HPP, especially those prevented with energy storage facilities; if their ancillary are to be driven at variable speed through the frequency converters, and/or soft starters, higher efficiency is expected along with some characteristic electromagnetic pollution . Some practical remedies are discussed into this work, regarding the so-called electromagnetic compatibility EMC. The authors' original approach consists also into one new enlarged vision of this framework, regarding the harmonic pollution into the National Power Grid – SEN, involving the both sides – main contributors, the transportation network and the herewith focused hydro power plants HPP, both generating and motoring.

16. EMC ISSUES RELATED TO H-FIELD RADIATED BY ESD IN THE PROXIMITY OF APPLIANCES AND ELECTRONICS

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Abstract

Electrostatic discharges are a real danger for all electronics and domestic appliances, being able to inactivate such devices. The main idea of this paper is an analysis of the magnetic field wave properties in dependence upon distance from discharge point in order to obtain a quantification of electromagnetic pollution in surrounding environment of electronic equipments and appliances.

Since ESD is a transient, very fast event which involves high currents and very broad frequency spectrum, it may damage electronic components and cause them malfunction or electromagnetic coupling problems.

EN 61000-4-2 standard specifies test configuration for electrostatic discharge (ESD) immunity testing. By this test the device under test is subjected to both electric and magnetic field waves generated by discharging process. For magnetic field emission measurements is used a passive, near field probe.

In the paper the results of the analysis of the several factors influence upon magnetic field wave above horizontal coupling plane are presented. These factors are:

- the type of ESD gun,
- the polarity of discharge,

the human body position in the environment where the discharge occurs.

17. LONG-TERM EXPOSURE TO MOBILE COMMUNICATION RADIATION: AN ANALYSIS OF TIME-VARIABILITY OF ELECTRIC FIELD LEVEL IN GSM900 DOWNLINK CHANNELS

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Abstract

Interest for knowing long-term human exposure levels due to mobile communications has increased in the last years. It has been shown that short-term exposure assessment made under standard procedural restrictions is not reliable when it comes to conclusions on long-term exposure levels. Present work is the result of a several-week analysis of time variability of electric field level inside traffic and control channels of the GSM900 mobile communication downlink band and it indicates that a temporal-model to allow future predictions of exposure on the long run is obtainable. Collecting, processing and statistically analyzing the data provide expression of the maximum and weighted field strengths and their evolution in time. Specific electromagnetic footprints of the channels have been extracted, differentiations between their characteristics have been emphasized and practical advice is provided, with the scope of contributing to the development of reliable procedures for long-term exposure assessment.

18. EXPOSURE ASSESSMENT OF THE 2.5/5 GHZ WI-FI DUAL BAND RADIATION IN A CITY IN BELGIUM

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Abstract

In order to provide inhabitants of a city in Belgium freely with internet a WBSN outdoor Wi-Fi Base Station network of the Wavion family was installed by ZapFi Ltd who ordered GD-EMF-Consulting to measure the Wi-Fi radiation from the 2.5/5 GHz dual band in the city.

The aim of the exposure assessment was (1) to study if the Wi-Fi exposure was in compliance with the exposure limits of the Flemish region and (2) to compare the Wi-Fi exposure intensity with the intensity of the radiofrequency radiation (RF-radiation) of other wireless applications (FM, GSM, UMTS) in the city.

The RF-radiation of wifi and the other wireless applications in the city was recorded by means of the EME SPY 121 exposimeter (Antennessa) whereas the 6 minutes' spot measurements were performed by means of the SRM-3006 Spectrometer (NARDA).

As a general conclusion we can state that the outdoor wifi-radiation measured under different conditions in the city and in the school is substantially smaller than the 4.48 V/m exposure limit recommended by the Flemish region for residences of the general public. Moreover, in the city the wifi-radiation is substantially smaller than the radiofrequency radiation of the GSM-family (GSM-900 & 1800 MHz bands and UMTS).

Acknowledgement: We are grateful to ZapFi International S.A. for sponsoring this project.

19. FREQUENCY SELECTIVE EVALUATION OF RADIOFREQUENCY ELECTROMAGNETIC EXPOSURE CHARACTERISTIC IN OFFICE ROOMS LOCATED IN VARIOUS REGIONS OF POLAND

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Abstract

Key words: electromagnetic fields, occupational, measurements, exposure pattern

The characteristics of radiofrequency electromagnetic fields in office rooms were investigated in various regions of Poland, in urban and rural areas, where various systems of wireless communication are available and in various distances to the mobile phone base stations or broadcasting centers. The complexity of exposure in frequency domain have been covered by the root mean square value of electric field strength measurements by data-logger of 12 selected frequency ranges related to typical electromagnetic field sources from 88 - 2500 MHz frequency range (eg. FM radio, TV analogue and digital, wireless communication TETRA, GSM, DCS, UMTS). The following statistical parameters representing registered electric field were calculated: minimum, maximum and median values, as well as 25 and 75 percentiles, for results from each frequency range and for total value representing complex exposure. Statistical analysis were performed using the software package Statistica, Version 7.0.

Acknowledgments: This work has been carried out within the second stage of the National Programme "Improvement of safety and working conditions" partly supported in 2011–2013 within the scope of research and development — by the Ministry of Science and Higher Education/National Centre for Research and Development.

20. RADIATED FIELD IMMUNITY TESTS - STANDARDS AND PRACTICAL ASPECTS

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Abstract

Immunity tests are one of the most time consuming electromagnetic compatibility tests. The field uniformity restrictions imposed by the standards generate supplementary costs related to anechoic chamber certification and periodic field uniformity checks.

In this presentation we talk about a particular immunity test case and we emphasize the necessity to strictly follow the standards specifications in order to obtain repeatable results, although it is not sufficient in all cases. As an example, we present the case of a battery-powered Carbon Monoxide detector. The detector has a sensing element made of TGS 5401 Carbon Monoxide electrochemical sensor produced by Figaro, USA. This detector failed to pass the radiated field immunity test is a well-known European EMC laboratory, the main reason being the unit triggered by fault at some particular frequencies or in some frequency

intervals. These frequencies were located in the 300-380 MHz and 600-620 MHz, in both horizontal and vertical polarization modes. The manufacturer didn't make in-house or pre-compliance tests before sending the detector for final EMC certification, based on the assumption the sensor is in a metal-case and there could be no EMC problems.

We made the same tests on the same piece of equipment (the same physical detector) in our laboratory, by strictly following the specifications in the applicable standards. The unit did not triggered at all. The maximum continuous sweep rate allowed by IEC/EN 61000-4-3 is $1.5E-3$ decades per second, which is equivalent to 200 seconds per octave. The maximum step size allowed is 1% of the current frequency, so the shortest dwell time should be of 2.88 seconds. As per IEC/EN 55024, the duration for each individual frequency must not be over 5 seconds. We repeated the tests several times, and there was no alarm triggered. In order to discover the cause of the false triggering, we put the test in manual mode and maintained a fixed frequency - 330 MHz for several minutes. After 3 minutes and 45 seconds, the unit triggered the alarm. It was a false trigger, as there was no Carbon Monoxide inside the test room. Consequently, we made several tens of tests, with 8 different constructive identical detectors, and obtained the same results: all detectors triggered false alarms on some frequencies, but the time to trigger the alarm on each sensor was different, one to another. Again, the field was maintained constant on a single frequency for several minutes. We proposed to the detector manufacturer to supplementary shield the sensor and we repeated the test in the same non standard conditions. After several modifications of the shield itself, all 8 units passed the test.

By investigating the things, we discovered the Carbon Monoxide sensor has a warm-up time of about 60 seconds, and the operation principle is based on a chemical reaction inside the sensor. As the chemical reaction inside the sensor is obviously influenced by the electric field, it may behave erratically in real-life operating conditions.

Some questions have to be put regarding the standard itself and the test conditions for some types of equipments:

- How are addressed the devices having non time-constant or even non-periodical operating principles?
- If a device contains some chemical or electrochemical detectors and the reaction inside may be influenced by the electromagnetic field, in different ways at different frequencies and field strengths, in a way it produce false alarms or even loss of functionality, how could we test it?

21. IMPROVING STANDARDIZATION PROCESS OF INTERNATIONAL INTERLABORATORY ELECTROMAGNETIC FIELD HUMAN EXPOSURE MEASUREMENTS

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Abstract

Keywords: standardization; interlaboratory; measurements; electromagnetic fields; human exposure

International Interlaboratory Electromagnetic Field Human Exposure Measurements have been organized for three times: in 2006, 2008 and 2011. The goal was to assess a technical competence of the nationally accredited laboratories, as well as to survey laboratories' continuing performance on international level. The proficiency testing study showed performance of a laboratory by means of executing measurement tasks by more laboratories in accordance with predefined conditions. The interlab results showed that most of the participating nationally accredited laboratories were able to provide results of performing measurement tasks and that all of them got positive results. The results, which are obtained by laboratories and specific experience in interlaboratory activities on environmental measurement, are discussed.

22. SIMULATION AND ANALYSIS OF EMISSIONS FROM A SWITCHED MODE POWER SUPPLY AND METHODS OF REDUCING THEIR

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Abstract

Switched mode power supply of high frequency up to 1 MHz are presented and analyzed. These sources are indispensable for modern electronic circuits. The operation of a switched mode power supply are simulated and analyzed. Are highlighted waveforms of currents which can generate electromagnetic interferences. An analysis in frequency domain of common mode and differential mode currents which can generate conducted emissions in supply cable of equipment that contains such a switched mode power supply is presented. The results thus obtained are compared with the European standards (EN 55022). The simulation performed standard CISPR 16-1-2 (with respect to specifications, methods and measure apparatus for measurement of disturbance and immunity to conducted emission). Finally solutions are discussed and simulated interference limitation and control driven by conducted emissions resulting from common mode currents and differential mode, with the range frequency 150 kHz – 30 MHz, currents that generate radiated emissions in the supply cable (being a potential source of interference with other electrical equipment). As a measure to limit the analyzes and simulates different ways of limiting electrical filters based on. The results are again compare with existing EMC standards.

23. AROUND THE CONCEPT OF ELECTROMAGNETIC FIELDS IN SCHOOL HABITATS

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Abstract

This paper is an attempt to introduce the definition of the concept of field in habitat electromagnetis school (SEMF). Niche concept is necessary because 33% of developed countries and 10-15% in other countries are under the effects of anthropogenic fields. The concept is built by analogy with the DEMF (Domestic Electro Magnetic Field).

This paper is based on measurements taken in areas of educational institutions: University of Oradea (public = case study 1), the National College "Samuil Vulcan" in Beiuș (public = case study 2) and General School "Nicolae Popoviciu" of Beius (public = case study 3)

24. THE RADIO FREQUENCY SYSTEM DEDICATED TO THE STUDY OF CARBON NANOTUBES BEHAVIOUR

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Abstract

Key words: SWNT, radio frequency

Introduction

The purpose of the study is to use viabilised nanostructures, as carriers for delivery of different drugs or structures into the cells using different methods (injected intratumoral or send via blood flow) in cancer treatment.

Material and methods

The radiation system is composed by a chain of RF Amplifiers and an manufactured antenna, working on 13,56 MHz.

The effect is evaluated inside the antenna, knowing the necessity to know the structure of field intensity in the interes area.

Conclusion

The experiments on CNT structures were carried out to evaluate several properties and parameters :

- Radiation power
- Radiation time

Thermal effects of the radiation

25. MATERIALS FOR THE NAVAL ELECTROMAGNETIC SHIELDS

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Abstract

Keywords: electromagnetic disturbance, attenuation, electromagnetic shield, weak-magnetic-materials

To ensure protection of naval electronic systems and crew against electromagnetic disturbances on board we must analyze, among other things, the shielding qualities of the materials used to build the ships. Moreover, in case of warships to protect the ship against magnetic mines.

Within EMC field, the antistatizing shielding solutions represents one of the most frequently used techniques of protection in present state of the art, implying a judicious choice of materials as well as of the ship construction.

This paper focuses on the above mentioned approach, having as a starting point the short presentation of the method of shield calculus, known as method of impedances (a practical one), and the presentation of the attenuation expressions through reflection and absorption, covering the whole range of frequencies between 50 Hz to 20 GHz, common upon the civilian and military ships.

We have analyzed some aspects concerning the near fields shielding (at low frequencies) and of far fields as well (at high frequencies).

On the basis of these relations we aimed at establishing materials for naval electromagnetic shields, including weak magnetic warship building too.

26. POWER FACTOR CORRECTION AND HARMONIC MITIGATION OF ADJUSTABLE SPEED DRIVES

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Abstract

Based on their inherent power processing capabilities, AC Adjustable Speed Drives (ASD), incorporating power electronics, became a key element of most process automation, [1, 2].

Although the well-known benefits, especially with regard to energy saving and process control, ASDs are revealed to be significant distorting loads for power distribution system, responsible for a serious harmonic pollution of the electric supply system, [2,3,4].

Power factor compensation in a grid affected by harmonic distortion produced by non-linear loads, such ASD's, requires a more specific approach, because the resonances that can occur in the supply network. To avoid these resonances, the simplest solution is to use a single reactor connected in series with the distorted load. Another common solution is to connect a series inductor with the capacitor, in such a manner that the fundamental reactive power is compensate, but the harmonics are not amplified. This filter is known as a detuned filter. The capacitance of the capacitor is selected in order to compensate the reactive power at the desired level, and the inductance of the reactor is calculated so that the tuned frequency of the series resonant circuit formed with the capacitor is lower than the lowest harmonic frequency possible in the network (normally the 5th harmonic). The detuned filter behaves like a capacitor below its resonant frequency, that is, at the fundamental frequency it produces reactive power for the compensation purpose. Above the resonant frequency, the behavior of the detuned filter is inductive, so it cannot amplify the typical harmonic frequencies such as the 5th, 7th, 11th harmonics, [6 and 7].

The main goal of the paper is to present some experimental results related to application of series inductors and detuned filters in some industrial power systems having connected some adjustable speed drives with induction motors and frequency converters. In order to point out

the effects of the use of series inductors with compensation capacitors, simulations results are also used in the paper.

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27. MEASURING THE EXPOSURE LEVEL OF THE HUMAN BODY TO RADIOFREQUENCY FIELDS FROM MULTIPLE SOURCES

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Abstract

As a result of technological development field generating sources number was constantly increasing. Currently have been developed a number of standards and guidelines that describe methods of measurement of radio frequency fields generated by multiple sources. Will describe methods of measuring electric field intensity of exposure to multiple frequency levels within a electromagnetic field domain.

28. STUDY REGARDING THE OPTIMISATION OF INTERFERENCES IN A VHF NETWORK

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Abstract

This paper's purpose is to analyse and optimise the problems of interference in a cellular network. With the use of the Radio Mobile software, some particular situations are simulated and an analysis of the interference is done, revealing the problems that occur in the studied cases. The minimum signal to interference ratio (SIR) is then raised using "test the water" method, and the results are presented and discussed in the final part of the paper.

29. THE MATHEMATICAL MODEL AND DATA ACQUISITION OF AN UNDERWATER EXPLOSION

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Abstract

This report presents the triangulation of the underwater explosion source. The analysis is based on the time-delay measurement the underwater acoustic wave, deriving the range and the direction to the underwater source of explosion. The mathematical model is simulated for different values of the time-delay at three sensors. It was built a practical demonstrator, which gave the possibility to verify in real environment the mathematical model.

Key words: Underwater explosion, triangulation, data acquisition.

30. FETAL ECG DETECTION USING RECURRENCE PLOT ANALYSIS

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Abstract

In our opinion under the study of bicompatibility is to analyze the effect of electromagnetic presence on the normal human functions. That's why we propose to study on pregnant woman ECG.

The field of electrocardiography has been in existence for over a century, yet despite the analysis of fetal ECGs is still in its infancy. This is, partly due to a lack of availability of gold standard databases, partly due to the relatively low signal to noise ratio of the fetal ECG compared to maternal ECG(caused by various media between the fetal heart and the measuring sensor electrodes, because of the fetal heart is simply smaller).

In this paper we applied recurrence plot analysis method for invasively recorded abdominal ECG. This method is based on the analysis of the recurrences of the state space trajectory of the system under study, analysis that has been employed especially for studying chaotic dynamical systems like ECG signals. The method is successfully applied to reduce the effect of noise. From the point of view of the ECG signal, the effect of the electromagnetic field can be considered like a noise. Spectral overlap of the signals, the small amplitude and attenuation of the fetal electrocardiogram, uterine contractions, multiple sources of noise are making the detection of fetal ECG from abdominal signals a difficult process.

The purpose of this paper is to extract fetal ECG with eliminating the noise using Recurrence Plot Analysis (RPA).

31. LYMFOCYTE- MACROPHAGE INTERACTION IN THE EXPERIMENTAL EXPOSURE TO ELECTROMAGNETIC FIELDS. A POSSIBLE PROTECTIVE EFFECT OF THE GEMOTHERAPIC PRODUCT, PRUNUS PERSECA

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Abstract

Keywords: EMF, Immune response, Macrophage, Lymphocyte, FR, Cytokines

Although the physical techniques for measuring of the electromagnetic fields (EMF) are well developed, adequate characterization of the biological effects induced by EMF is subject of discussion yet. We don't know the effects that would be after a long term of exposure. Many scientific studies have been devoted to assessing what health risks are associated with EMF exposure. Data from the recent experiments suggest that EMF are associated with the iron-mediated free radical (FR) generation, that can cause damage in the biologic molecules such as lipids, proteins and can profoundly affect cellular homeostasis.

The aim of this study was to show the effects of the chronic exposure to EMF on the immune and oxidative response in the cellular cultures in vitro and in vivo experiments. In vitro experiment was carried out on the alveolar macrophages and splenic lymphocytes. In vivo

experiment was carried out on the 80 Wistar rats that were divided in 8 groups as following: 1. Control-group, without exposure, sacrificed at 1 month; 2. Control-group, without exposure sacrificed at 6 months; 3. EMF-exposed group, sacrificed at 1 month; 4. EMF – exposed group, sacrificed at 6 months. 5. Group treated with PRUNUS PERSECA and sacrificed at 1 month; 6. Group treated with PRUNUS PERSECA and sacrificed at 6 months; 7. EMF- exposed group, treated with PRUNUS PERSECA and sacrificed at 1 month; 8. EMF- exposed group, treated with PRUNUS PERSECA and sacrificed at 6 months. The rats were exposed to EMF that cover a range of the frequencies between 140-160 MHz. The following parameters were assessed: 1) Blastic transformation of T lymphocytes ; 2) IL-1 assay; 3) TNF-assay; 4). Macrophage migration inhibition test (MIF); 5) Phagocytosis assay ; 6) Chemiluminiscence assay .

The Blastic transformation of T lymphocytes was decreased in the EMF- exposed groups, as compared with control groups. Altered values of the cytokines (MIF, IL-1, TNF), an inefficient phagocytosis and an important increased level of the FR were found in the 3 and 4 – groups.

Our results indicate an association between magnetic fields and immune and oxidative reactions, suggesting important modifications in the group with EMF -prolonged exposure.

In all the groups treated with PRUNUS PERSECA the values of the investigated parameters were partially reversible, suggesting a protective action of this gemotherapeutic product.

32. THE ELECTROMAGNETIC POLLUTION OF THE ENVIRONMENT – ONE OF THE BIGGEST CHALLENGES OF HUMANITY IN THE 21TH CENTURY

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Abstract

Studies showed that when overlapping the electrolytic systems, the A.C. electrical field may modify substantially the mechanism and kinetic of redox reactions occurred in species II electroconducting media (electrolytic media). The first studies about the influence of the alternative electrical field overlapped on electrochemical systems were reported by J. Dévay and T. Erdey-Gruz. [1]

The core of any living matter is the *cell*, a complex electrochemical system made especially of cytoplasm (electrolyte – amino acids, proteins etc.) and the cellular membrane. The complex redox reactions occurred at the cytoplasm's interface with the cellular membrane dictate practically the evolution of life. Any anthropic electric field changes the natural kinetic of the electrochemical reactions in the cell, therefore the natural development of the cells. Hence, we can say that electric fields made by man, both A.C. and D.C. ones, are pollutant since they perturb the evolution of the living systems. In the past four decades the influence of anthropic electric fields on living systems has been subject of many studies [2]

The systems which generate, transport, distribute and use electrical energy are the main sources of pollution of natural media with electromagnetic signals. The industrialization and technological development in the last decades has as consequence the increasing of production and use of electrical energy. Therefore, the electromagnetic pollution runs high constantly. On the other hand, the electrical power is realized mainly by the burning of fossil fuel which produces billion tons of carbon dioxide per year. Simultaneous we can assist in constant decrease of forest areas, as follows, the O_2 / CO_2 ratio in the atmosphere decrease.

Consequently, the biosphere confronts serious challenges, respectively the concerted actions (with synergic effects) of the continuous increase of electromagnetic pollution and the decrease of oxygen concentration in the atmosphere.

In this context, the present paper deals with the socio-technical-economic aspects which generated this present state and sets out some possibilities toward cutting back the risks and negative effects of electromagnetic pollution on natural environment.

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33. INFO DAY BISNET TRANSYLVANIA - SUPPORT NETWORK OF BUSINESS AND INNOVATION FOR SMES IN TRANSYLVANIA

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Abstract

National Institute for Research and Development in Electrical Engineering ICPE-CA through Technological and Business Incubator from Sfantu Gheorghe, develops the project BISNET Transylvania - "Support Network of Business and Innovation for SMEs in Transylvania", financed by framework program Competitiveness and Innovation directly by the European Commission. The project is developed in a partnership of seven institutions and organizations from Transylvania, giving those the membership in the European Network for Enterprise (Enterprise Europe Network).

Enterprise Europe Network is a key instrument in the EU strategy to stimulate the SMEs growth. The network brings together over 570 business support organizations from 45 countries whose mission is to assist small businesses to take full advantage of business opportunities in the European Union. Enterprise Europe Network is managed by the Executive Agency for Competitiveness and Innovation - EACI and is part of the Program for Competitiveness and Innovation. Enterprise Europe Network (EEN) is a Support Network of Business and Innovation for SMEs, an one stop shop for information on EU legislation, funding opportunities, assistance in finding business partners and technologies and help developing research and innovation capacity of SMEs.

SMEs in Central and North-Western region of Romania may resort to Transylvania BISNET Consortium to benefit from the free services offered through the Enterprise Europe Network.

Objectives of the project are focused on services such as:

- Free help to expand business in the European market by identifying partners both in business and technology cooperation and innovation for the European market;
- Information and free advice on accessing European funding sources, especially encouraging participation in research programs, facilitating the identification of partners for research projects;
- Free information on European legislation and advice on intellectual property rights;
- Facilitate participation in trade fairs and promotional events organized by similar institutions in Europe.

34. CHARACTERIZATION OF THE MICROWAVES LEVELS IN THE PROXIMITY OF ONE SCIENTIFIC MICROWAVES POWER EXPERIMENTAL SETUP FOR THE USER BIOLOGICAL PROTECTION PURPOSE

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Abstract

Our main objective was to prepare an experimental setup for laboratory convection experiments with internal, non-contact, microwave generated heating, applied to Earth's mantle dynamics. The internal volumetric radioactive heating represents the major source of heat in the Earth. We have proposed to model the radioactive heating by microwaves absorption heating in the specific liquid system configuration.

The experimental unit (Figure 1) contains a microwave power generator of maximum 700W at 2.45 GHz frequency, connected to a rectangular cavity of 40 dm³. Because of the many access points in the cavity, it is necessary to perform an environmental microwaves power densities characterisation, in order to prepare the experiment in accord with the electromagnetic exposure rules.

In this paper we present our measurements and the base solutions to assure the biological protection in accord with ICNIRP requirements.

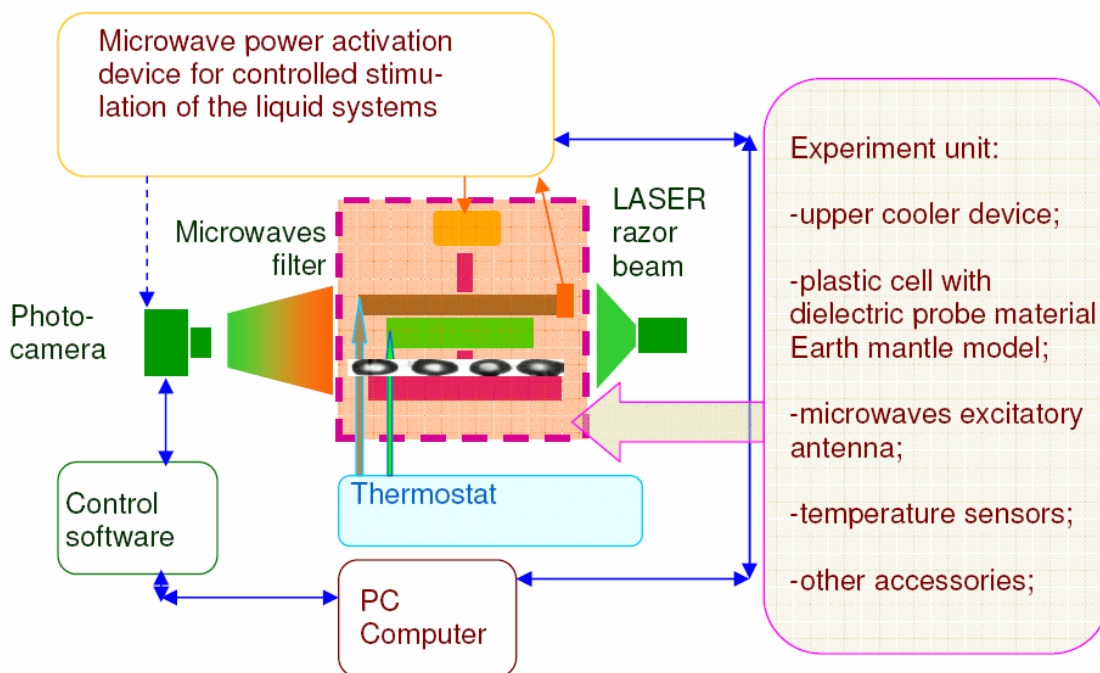


Figure 1

35. EVALUATION OF UNCERTANTY COMPONENT IN ASSESSING EXPOSURE TO NON-UNIFORM LOW FREQUENCY MAGNETIC FIELD CAUSED BY THE USE OF VARIOUS TYPES OF MAGNETIC FIELD PROBES

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Abstract

Key words: electromagnetic fields, exposure measures, numerical modeling

The correlation of exposure to non-uniform magnetic field (MF) of various spatial distribution (from quasi-uniform to highly localized) with electrodynamic effects of exposure was analyzed by numerical simulations of induced electric field and measurable MF parameters (representing the use of MF probes equipped with Hall sensor or loop antennas of 3-12cm diameter). The highest correlations were found between induced electric field and max MF in the point at the body surface or over MF probe located at the body position near the body surface ($p < 0.001$). The ratio of induced electric field to magnetic field measures in particular exposure scenarios ($K = E_{in}/B_f$) is in the range of 2.5-23 for Hall probe, when for loop antennas is in the range of 4.5-31, what create much higher uncertainty of exposure assessment than the probe calibration, which may not exceed 2% in the low frequency range.

Acknowledgments: This work has been carried out within the second stage of the National Programme "Improvement of safety and working conditions" partly supported in 2011–2013 within the scope of state services by the Ministry of Labour and Social Policy.

36. NEW COMPOSITE TEXTILE FABRIC USED IN ELECTROMAGNETIC FIELD SHIELDING

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Abstract

Key words: EMF, shielding, measurements, health, exposure.

Many scientific studies have been dedicated to assessing what health risks are associated with EMF exposure. The presented paper aims to find new possible materials with shielding properties against EMF radiation, generated by different equipments.

This paper presents an analysis of the results over field measurements based on the electromagnetic field theory, shielding methods for fixed or mobile, rigid or flexible enclosures, panels or boxes, for different equipments are analysed. It is discussed the measurement compliance with the requirements of the international standards from the viewpoint of the limits and measurement uncertainty. A new composite textile fabric, based on microwires from different alloys such as Cu, $\text{Co}_{77,1}\text{Fe}_{\text{rest}}\text{B}_{7,3}\text{Cr}_{3,6}\text{Mn}_1\text{Si}_{10}$ and $\text{Co}_{75}\text{Fe}_{\text{rest}}\text{B}_{9,4}\text{Cr}_{3,6}\text{Mn}_1\text{Si}_{11}$ is analyzed taking into account measurements regarding attenuation of EMF in the range of 500 MHz – 2 GHz, in order to find the optimum shielding level of this new textile material. There are also presented experimental results and equipments used to determine shielding effectiveness putting emphasize especially on the materials used to this end.

37. 3D REPRESENTATIONS OF THE NOISE IN A PCB BASED ON THE SELF AND TRANSFER IMPEDANCES OF THE POWER AND GROUND PLANES

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Abstract

Keywords: power integrity, power distribution network (PDN), power and ground planes, 3D representation.

The analysis of the Power Distribution Networks (PDNs), termed as Power Integrity (PI), is performed in the frequency domain and primarily implies analyzing the power and ground planes and the decoupling capacitors. Power and ground planes pairs are widely used on high-speed Printed Circuit Boards (PCBs). Planes with dielectric layer separation form an integral part of a power delivery network. Analytical expressions are available to describe the self-impedance and the transfer impedance between two ports of a plane pair consisting of power/ground planes, using Green's function for rectangular plane pairs. Based on early paper [1], our goal is to develop a MATLAB tool to analyze the noise in a PCB based on the 3D representations. Based on these representations, the user can perform noise analysis to visualize the decoupling strategy and to make important decisions on how many capacitors are really needed to make the PDN work.

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38. FIRST AND SECOND ORDER SQUID GRADIOMETER DESTINED TO OPERATE IN UNSHIELDED ELECTROMAGNETIC ENVIRONMENT

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Abstract

The paper presents theoretical and experimental results of the research to achieve a complex biomagnetometer consisting of three first order axial gradiometer and a second order gradiometer, with electronic subtraction. Researches have been focused toward finding some methods of enabling operation of the SQUID gradiometer in an unshielded electromagnetic environment. The solutions adopted have the advantage of eliminating the complex annexes used for shielding the ambiental magnetic fields. The components of these complex fields are: the geomagnetic field and due to power supply network. These can be compensates with large Helmholtz coils system and shielded rooms. These annexes make it difficult to use in a clinical care unit.

We present solutions to tackling the perturbations, related to environmental characteristics in a hospital electromagnetic environment. The SQUID gradiometer is used to perform magnetocardiographic exploration in hospital environment. The paper describes the calibration

method and the performances of the submitted gradiometer, comparative with similar installations.

39. BIOLOGICAL EFFECTS IN LONG-TIME EXPOSURE TO EMF. CORRELATIONS AND INTERFERENCE IN EXPERIMENTAL AND CLINICAL STUDIES

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Abstract

Key words: Electromagnetic fields, experimental, epidemiological studies, biological effects, oxidative, immune response, micronuclei.

Aim of this paper is study of biological effects in chronic exposure to electromagnetic fields, with emphasizing of possible correlations and interference resulting from experimental and clinical epidemiological studies. We performed:

1. In vivo studies in animals following a series of immune response (lymphocyte blast transformation, cytokine release) and oxidative response (luminol-enhanced chemiluminescence and lipoperoxides).
2. Clinical epidemiological studies (study I-preliminary health risk assessment in radio-communication workers occupationally exposed to RF and MW EMF's; study II- assessment of physiotherapists health risk exposure to EMF's) performing a specific questionnaire of symptoms for EMF exposure, measuring micronuclei, thioethers, setting exposure and biological effects markers.

For statistical analysis results we used software for multivariate analysis and logistic regression models.

EMF exposure parameter is an important marker of correlation between biological effects and parameters of health impact. Characterization of electromagnetic environment was done by domain's experts with internationally approved specific technical equipment.

Our results suggests a possible alteration of the cellular type immunity, which seems to be associated with an increase in reactive oxygen species, lipoperoxides (probably by Fenton reaction), in chronic exposure to EMF's. Data from experimental study could be correlated with results obtained in our epidemiological studies (neurological effects, cardiovascular, immune, osteoarticular, micronuclei and urinary thioethers) in dose-response relationship.

Changes in oxidative and immune response, micronuclei values, associated with significant health impairment, under conditions of chronic exposure to EMFs, could possible suggest a genotoxic effect of these fields.

40. COMMUNICATION CABLE IMMUNITY TO ELECTROSTATIC DISCHARGES

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Abstract

Nowadays, the researches in the field of electrostatic discharges have been intensified, due to the impact of electrostatic discharges (ESD) on industrial equipment, especially on the electronic devices. Models of the electrostatic discharges were proposed and specific methods for reducing the ESD phenomena and for ESD sources mitigation were implemented.

However, the development of the ESD processes, the proposed models, the limit level values of the ESD immunity testing for different electric and electronic equipment have not been sufficiently substantiated.

In this paper the ESD transients due to HBM in communication cables are investigated. The tests show that the shielded communication cables have superior behaviour compared to the unshielded cables but are not immune to the ESD processes.

A possible cause for the weaker ESD immunity of the communication cables is the presence of gas-air cavities in the cable's dielectric in which corona /breakdown could be occurred.

Keywords: Electrostatic discharges (ESD), communication cables, HBM model, ESD immunity testing, ESD model.

41. APPLICATION ORIENTED LINE FILTERS FOR SUPPRESSING COMMUTATION DISTURBANCES

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Abstract

Current industrial and household applications are provided with complex functions, achieved in many cases through means of commutation devices. The use of manual switches or relays in order to connect or disconnect loads is associated with commutation disturbances that propagate into mains and disturb other equipment. Commutation disturbances represent an up-to-date subject, taken into consideration by researches and regulation organizations, as IEC or other technical committees.

In order to prevent it, line filters can be utilized but usually general purpose filters are not application oriented: efficiency and costs are not optimal.

This paper is concerned with developing line filters utilized to suppress disturbances due to nowadays household appliances. In order to achieve the purpose, maximum and average values of disturbances produced when commuting a series of devices under test are considered. Frequency characteristics of the models obtained through experimental determinations are compared with simulations and results are interpreted case by case. Furthermore, additional experimental determinations are carried out when switching loads and a filter is added in the switched circuit. Results are compared with the ones obtained when no filter is utilized and interpreted. Determinations are performed for a series of typical household devices.

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42. ELECTRICAL EQUIPMENT TESTING TO DEFORMING REGIMES

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Abstract

In an electromagnetic environment, more and more polluted with harmonics, the electrical and electronic equipment testing to conducted electromagnetic disturbances became a necessity.

Miniaturisation and working frequency increasing create for electrical consumers' new vulnerabilities, errors, faults and even failures.

Recent researches are concentrated to the establishing the sources of harmonic pollution, the investigation of the harmonic pollution impact on the electrical networks and on other consumers, for establishing the new methods for limitation the effect of harmonics.

Other researches have in view the development of new methods and tools for testing to the immunity to the deforming regimes and also for the establishing the limits of harmonics emissions.

The aim of the paper is to do a comparative analysis on the harmonic emission limits of some electric drives and other types of consumers. The immunity tests on these equipments are also described. The tests data are bases for establishing the class limit of testing, and also to establish the harmonic emission influence on the electrical network.

Experimental determinations are made in CEM Laboratory of the Research-Development-Innovation Institute of Transilvania University of Brasov.

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43. COOPER PLATED TEXTILE FOR EMIS APPLICATION

Nicolae STANCU, Ioana ION, Magdalena LUNGU, Ion DOBRIN, Violeta TSAKIRIS, Mariana LUCACI, Alexandra BRĂTULESCU, Cristian MORARI, Ionuț BĂLAN

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Abstract

The paper presents the research results on the development techniques for realization of cooper plated textiles on three types of textile supports: linen, cotton and polypropylene. The aim is the obtaining protective shielding for polluted environments with electromagnetic radiation. The cooper plated textile was realized by electrochemical deposition method and characterized by optical microscopy in order to reveal the surface morphology. The electrical and magnetically measurements for permittivity and shielding effectiveness are also evidenced. The results have shown good adherent properties of Cu on the textile supports and good electromagnetic attenuation properties.

44. DIAMOND ON OXIDE NANOTRANSISTOR WITH HIGH PERFORMANCES SUITABLE FOR GIGA-HERTZ OPERATION

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Abstract

Nano-electronics offers suitable solution for nanometric vacuum devices with new applications. On the other hand, the diamond is an excellent material for special functions and nano-scale integration. In a previous paper, a SOI Silicon On Insulator MISFET with a thinner p-type film between source and drain regions was presented, [1]. The nano-transistor with MIS conduction way and vacuum conduction way between source and drain, controlled by the gate bias is proposed now on diamond. Essentially the device is composed by two diamond nano-films on insulator and the cavity or the nothing region is in the middle. The tunneling drain current is modeled as output characteristics. The transfer characteristics were poorly investigated in Si, but they prove the main distinctive feature of this DOI Diamond On Insulator nano-transistor versus the lateral diamond field emission device. In this paper the diamond nano-transistor is simulated in order to extract the static characteristics, the optimum transconductance and the insulator breakdown conditions. The input data for the simulated structure are the diamond films with 10nm thickness on 10nm insulator with a cavity width of 2nm. The simulation results establish the optimum pairs of materials as Diamond On Oxide, which offers a maximum drain current of 8.9nA and leakage currents under 1pA. The potential applications are discussed in respect with some experimental data. Figure 1 a and b presents the device simulation results.

The internal capacitances are in the range $10^{-17}\text{F}/\mu\text{m} \div 10^{-18}\text{F}/\mu\text{m}$, allowing hundreds of gigahertz operation frequency.

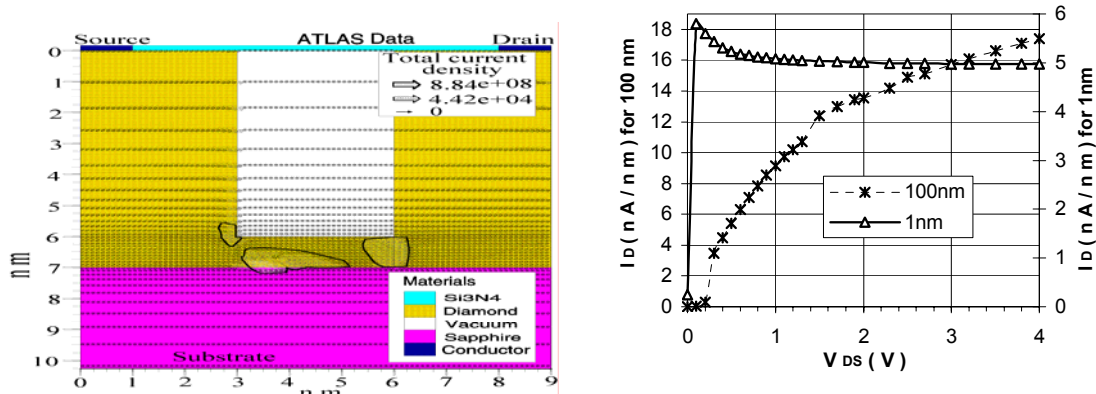


Fig. 1. (a) The current flow thru the diamond device; (b) the simulated static characteristics

Acknowledgment: The paper is achieved in POSDRU 62557 sectorial program.

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45. SWITCHING POWER SUPPLY IMMUNITY TO RF DISTURBANCES

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Abstract

In a increasingly loaded electromagnetic environment, the electric and electronic equipments are exposed to a higher diversity of electromagnetic disturbances. Miniaturization, which imposed the decreasing of the level of equipment's supply voltages, and higher operating frequencies, all increase the new vulnerabilities to the electromagnetic disturbances immunity. More complex equipment, most of them with command and control integrated devices, and with digital devices and subsystems for communications by wire or wireless, are opening new coupling paths for disturbances. This kind of electromagnetic environment leads to errors, faults and even to equipment's damage.

Current researches investigate the electromagnetic disturbances transmission and coupling paths in order to mitigate their impact on the victim.

There are investigations on radio-frequency (RF) electromagnetic disturbances, which highlighted the propagation mode of disturbances either in free space either inside bodies.

There are certain dimensions of the bodies in connection with specific frequencies of electromagnetic field, at which electromagnetic waves protrude from the bodies, and propagate by free space.

Measurements in shielded enclosures on disturbances signals of various equipment have shown the correlation of equipment's constructive parameters and the level of electromagnetic compatibility.

The goal of this paper is to develop a comparative analysis of the equipment's constructive parameters impact on the immunity level for RF disturbances. The current RF test methods and tools are analyzed and some results of the tests developed in EMC Laboratory of the PRO-DD Research-Development-Innovation Institute of Transilvania University of Brasov are presented.

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46. CAPACITIVE COUPLING INTERFERENCE PHENOMENA ON THE SURFACE OF PCB'S

Alina Elena RADU

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Abstract

Capacitive coupling occurs in the presence of the electric field on any metal conductor. The purpose of this paper is to emphasize the capacitive coupling which appear if the voltages difference between the two circuits is large. C_1 and C_2 are two different potential conductors located on a wiring of Pertinax. With the Electrostatics model from Comsol Multiphysics I studied capacitive coupling at the surface of a PCB.

In the figure 1 is presented model geometry and mesh network

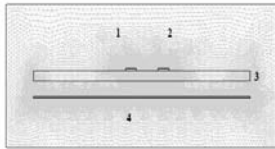


Fig. 1 Geometry and mesh

- 1- C_2 conductor
- 2- C_1 conductor
- 3- PCB
- 4- Metallic plate

Comsol simulations

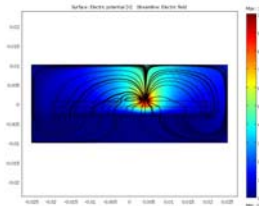


Fig.2 Electric potential lines of electric field when the two conductors are at 2 mm distance from each other

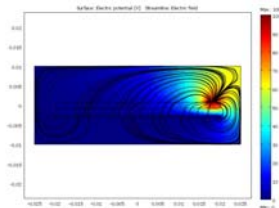


Fig. 3 Electric potential lines of electric field when the two conductors are at 15 mm distance from each other

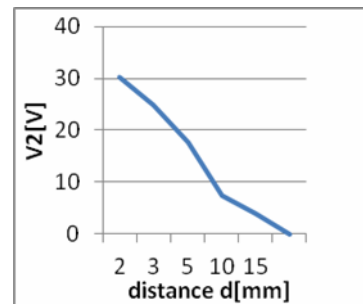


Fig. 4 Electric potential of conductor 1 in function of distance

Finally, a comparison is made between simulated and experimental values.

47. CURRENT ASPECTS AND TRENDS IN STANDARDIZATION, WITH REFERENCE TO GENERAL EXPOSURE IN NEAR FIELD ELECTROMAGNETIC RADIATION

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Abstract

Contemporary evolution of wireless communication devices and their common use in day-to-day living requires careful monitoring of the conditions characteristic to the exposure of the

population to electromagnetic radiation and the minimizing of the associated health risks. Technical standards issued by the International Electrotechnical Commission (IEC) represents the European reference for the assessment of human exposure conditions in the near field radiation and evaluation of the compliance with ICNIRP and EC protection guidelines.

The objectives of the paper are directed on several directions:

- short review of IEC standard series (62209, 62369, 62311, 62479) related to human exposure in the near field;
- recent work of TC106 of IEC and correspondent TC279 of ASRO for the concept and discussion of a new edition of the IEC 62209-1 document;
- working aspects and practical experience of applying compliance-testing standards at the SAR Laboratory of ICMET Craiova;
- national regulations and technical standards in the field.

48. CELL PHONE AND HUMAN HEALTH

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Abstract

Public exposure to electromagnetic radiation is growing exponentially worldwide. There is a rapid increase in electrification in developing countries, even in rural areas and in using of wireless devices. Mobile or cellular phones, cordless phones and pagers are now an integral part of modern telecommunications. In many countries, over half the population use mobile phones and the market is growing rapidly.

Cell phone technology has changed quickly over time and continues to develop, which means that human exposures also change over time. Given the large number of mobile phone users, it is important to investigate, understand and monitor any potential public health impact.

In this paper are presented issues related to use of cell phone, exposure to radiofrequency radiation and risks on human health.

49. INDUCTIVE COUPLING INTERFERENCE PHENOMENA ON THE SURFACE OF PCB'S

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Abstract

Magnetic coupling occurs when magnetic field lines of an electrical circuit are closing into another electrical circuit. This can be an undesired effect that affects both circuits.

The coupling element is mutual inductance. This paper aims to analyze the effects of inductive coupling determined by the variation of a disturbing electric current.

Coupling capacity or mutual inductance between two circuits will be determined by solving the electromagnetic field issue.

The effects of the inductive coupling will be simulated in COMSOL and will also be experimentally determined with a PCB.

50. ELECTRONIC CONTROL MODULE DESIGN FOR ELECTROMAGNETIC COMPATIBILITY

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Abstract

Index Terms: electromagnetic compatibility; simulation; modelling; electromagnetic radiation; design for EMC.

The design of electronic control module, which represents a proprietary solution for obtaining low conducted electromagnetic disturbances and low radiated emissions, emphasizes the importance of taking into consideration the nonideal behaviour of electronic components and the

necessity of including electromagnetic interference suppression components as well as filtering. The present paper focuses on the CAD design for EMC of the module, as well as electromagnetic measurements taken in a semi-anechoic chamber and by secondary measurements taken in a transversal electromagnetic mode cell (TEM-cell) and optimization from EMC points of view realized using 3D modelling and specialized EM simulation software, namely REMCOM XFDTD, for evaluating the performance and electromagnetic field effects of the electronic module considered a radiation source. Based on the experimental and simulation results, the authors intend to develop a design methodology in order to complete the design for electromagnetic compatibility (DFEMC) activities in case of the new electronic products development process.

51. SELECTIVE SHIELDING PROPERTIES OF MULTILAYERED GLASS COATED AMORPHOUS WIRES

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Abstract

Glass coated amorphous magnetic microwires (GCAW) known as soft magnetic materials^[1] are intensively studied due to their large utilization in magnetic field sensors and electromagnetic (EM) shielding application. Recently, the as-cast CoFe-based GCAW has been successfully used for development of absorbent materials with omni-directional selective shielding properties of EM fields^[2]. The multilayered GCAW obtained from as-cast GCAW subsequently coated by RF sputtering deposition followed by electrochemical deposition with a nonmagnetic metallic layer are another class of soft magnetic materials.

The aim of this paper is to investigate the magnetic and dielectric losses through which the absorption of the microwave EM field in multilayered CoFe-based GCAW occurs in order to develop an absorbent material with improved selective electromagnetic shielding efficiency. Experimental results indicate that the length (L) of microwires allows the control of the absorption frequency of the microwave incident field with wavelength λ and the thickness of the nonmagnetic metallic layer influences the ferromagnetic absorption properties of the multilayered GCAW, also.

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52. THEORETICAL BACKGROUND AND EXPERIMENTAL DETERMINATION OF THE GAIN OF PYRAMIDAL HORN ANTENNAS

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Abstract

This paper presents theoretical aspects and experimental data regarding the gain of pyramidal horn antennas. Gain measurements for two pyramidal horn antennas have been carried out using the substitution method and the results were compared with the theoretical data. The substitution method consists in comparing the power received by a reference antenna to the power received by the antenna under test. The experimental results agree with the theoretical data.

53. SHIELDING MATERIAL CHARACTERIZATION USING TWO DIFFERENT METHODS

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Abstract

The aim of this paper is to determine the shielding effectiveness of some materials using two methods and compare the results. The first method is based on the standard method MIL-STD-285 and the second one is a similar method using an acquisition system able to perform a complete rotation of the receiving antenna to scan all directions.

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