NUMERICAL MODELLING AND ELECTROMAGNETIC COMPATIBILITY RESEARCH CENTER

Contact details

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NUMELEC software and equipment details can be consulted on the https://eertis.eu web page.	

Areas of expertise

Numerical modelling and optimal design of electromagnetic devices (CAD).

- Multiphysics modelling for advanced device and technology developments.
- Numerical modelling of the electromagnetic field distribution in complex systems.
- High-frequency electromagnetic fields analysis and waves propagation.
- High-frequency antennas and filers design.
- Optimal design of electromagnetic devices and systems.
- Integrated circuit surrogate models for fast electrical parameter calculation.
- Optimization of the extraction and modeling of parasitic elements from the structure of integrated circuits, starting from the integration masks.

Electromagnetic compatibility (EMC)

- Pre-compliance and compliance according to the nowadays international standards: Radiated disturbances (emission and immunity); Conducted emissions; Immunity for electrostatic discharges ESD; Immunity for BURST, SURGE, and Voltage Dips; Immunity to conducted disturbances induced by RF fields; Immunity to industrial frequency magnetic fields.
- Human exposure to electric and magnetic fields in vicinity of electro-energetic systems.
- Human exposure to electromagnetic RF fields.
- Analysis of the electromagnetic interferences generated by HV (AC and DC) lines and cables on neighbourhood metallic structures and design of the cathodic protection systems.
- Identification and efficient modeling of possible coupling paths between signal/clock lines and interferences between functional blocks within circuits intended for generating clock signals in integrated digital systems.
- PCB design and practical implementation for RF inductivities and HF filters construction.

Team

Prof. Vasile TOPA, Prof. Calin MUNTEANU, Prof. Marius PURCAR, Prof. Claudia PACURAR, Assoc. Prof. Adina GIURGIUMAN, Assoc. Prof. Laura GRINDEI, Lect. Claudia CONSTANTINESCU, As. Sergiu ANDREICA, As. Marian GLIGA, As. Adrian BOJITA, As. Lavinia OPRIS, 8 PhD students.

Representative projects in the past 2 years

- *Digitalization of the design process of RFID multifrequency antennas and evaluation of human exposure to the radiation emitted by them*, no.31/08.04.2024, Romanian Academy of Scientists, Claudia Constantinescu, 2024-2025.
- *Electromagnetic compatibility study services for the E-INFRA project Electrogrup/Transgaz/Transelectrica/Ministry of Energy - HVDC (525 - 640 kV) Black Sea – Podișoru (Bucharest) - Hungary (BRUA corridor),* ELECTROGRUP INFRASTRUCTURE SA - E-INFRA, Calin Munteanu, 2023-2024.
- *Development and optimization of MIMO antennas and evaluation of human exposure to the radiation emitted by them***,** GNaC ARUT 2023, no.31/08.04.2024, Claudia Constantinescu, 2023-2024.
- *Digitalization of the process of assessing human exposure to electric and magnetic fields*, AOSR-TEAMS-II Contract - Digital Transformation in Sciences no. 31/11.04.223, Adina Giurgiuman, 2023-2024.
- *Carrying out electromagnetic field measurements and noise measurements within the project "Refurbishment of the 220/110 kV Baru Mare substation",* ELECTROGRUP SA, Calin Munteanu, 2024.
- *Study of the electric and magnetic field distribution in the 220 kV Vetis substation in the design phase***,** Smart Electric Design S.R.L., Calin Munteanu, 2024.

Representative publications in the past 5 years

1. Pacurar, C., Topa, V., Constantinescu, C., Munteanu, C.; Gliga, M., Andreica, S., Giurgiuman, A., „Adapting the Formula for Planar Spiral Inductors' Inductance Computation to the New Oval Geometric Shape, Ideal for Designing Wireless Power Transfer Systems for Smart Devices", *Mathematics* 2025, 13, 348, https://doi.org/10.3390/math13030348, IF:2.3, 2025.
2. Constantinescu, C., Andreica, S., Laszlo, R., Giurgiuman, A., Gliga, M., Munteanu, C., Pacurar, C., "Numerical Modeling, Analysis, and Optimization of RFID Tags Functioning at Low Frequencies", *Applied Sciences* 14, 9544. https://doi.org/10.3390/app14209544, 2024 (Q2).
3. Constantinescu C., Pacurar C., Giurgiuman A., Munteanu C., Andreica S., Gliga M., „High Gain Improved Planar Yagi Uda Antenna for 2.4 GHz Applications and Its Influence on Human Tissues", *Applied Sciences* 13, no. 11, 6678, ISSN: 2076-3417, DOI10.3390/app13116678, WOS:001005579400001, IF: 2.7, 2023 (Q2).
4. Giurgiuman A., Gliga M., Bojita A., Andreica S., Munteanu C., Topa V., Constantinescu C., Pacurar C., "Software Program for the Evaluation of Human Exposure to Electric and Magnetic Fields", *Technologies Journal*, 11/6, 159, IF: 3.6, 2023 (Q1).
5. Mociran B., Gliga M., „Optimization of an Inductive Displacement Transducer", *Sensors*, 23(19), 8152, IF 3.4, 2023.
6. Opris L., Munteanu C., "Simulation of the Electromagnetic Waves Propagation in Conductive Media using Analytical Formulae", *Bulletin of the Polytechnic Institute of Iasi*, Vol. 69 (73), No. 1, pp. 97-104, DOI:10.2478/bipie-2023-0006, 2023.
7. Florea C., Simon D., Bojita A., Purcar M., Boianceanu C; Topa V., "Test Structure Design for Defect Detection during Active Thermal Cycling", *Sensors*, 22, Issue 19, DOI10.3390/s22197223, 2022.
8. Bojita A., Purcar M., Florea C., Simon D., Boianceanu C., Topa V., "A Novel Multi-Scale Method for Thermo-Mechanical Simulation of Power Integrated Circuits", *IEEE Journal of the Electron Devices Society*, Volume 10, Page 169-179, DOI10.1109/JEDS.2022.3144530, 2022.
9. Pacurar C., Topa V., Giurgiuman A., Munteanu C., Constantinescu C., Gliga M., Andreica S., „High Frequency Analysis and Optimization of Planar Spiral Inductors used in Microelectronic Circuits". *Electronics,* vol 10, Issue 23, 2897, ISSN: 2079-9292, IF: 2.397, 2021.
10. Vermeșan H., Tiuc A-E., Purcar M., "Advanced recovery techniques of waste materials from IT and telecommunication equipment Printed Circuit Boards", *Sustainability* 2020, 12(1), 74; https://doi.org/10.3390/su12010074, 2020.

The offer addressed to the economic environment

CAD solutions	Multiphysics modelling in electrical engineering for advanced device and technology developments. Optimal design of the electromagnetic devices. Analysis and optimal design of complex HF electromagnetic device structures. Integrated circuit models development for fast electrical parameters calculation. Optimization of the extraction and modeling of parasitic elements from the structure of integrated circuits.
EMC solutions	EMC tests according to nowadays international standards for pre-compliance and compliance with CE marking. EMC tests in the design stage of an equipment and for prototypes respectively. Compliance with the 2013/35/EC Directive regarding the human exposure to electromagnetic fields. Compliance with the 2014/30/EC Directive regarding EMC. EMC modelling and simulations for electric and electronics engineering applications. Analysis of the electromagnetic interferences generated by HV (AC and DC) lines and cables on neighbourhood metallic structures and design of the cathodic protection system.

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