DEPARTMENT OF ELECTRIC MACHINES, DRIVES, ELECTRICAL LIGHTING AND ELECTROTECHNOLOGIES

MAIN RESEARCH FIELDS

- Electric machines and equipment modeling, simulation, optimal design and testing (EME)
  
  Keywords: electric machines, electric equipment, field calculation, optimal design, computer aided testing.

- Power electronics and motion control (PEMC)
  
  Keywords: electric machines and drives, power electronics, speed and position control, digital control.

- Switched reluctance motor drive (SRMD)
  
  Keywords: electric machines and drives, reluctance motor, power electronics, digital control.

- Power industrial electric drives (PIED)
  
  Keywords: electric machines and drives, power electronics, speed control.

- Electrical lighting and Electrotechnologies (ELE)
  
  Keywords: electromagnetic fields, applied electrostatics, welding, electrothermal processes, ultrasonics, power electronics, lighting devices.

- Logic of the creative process (LCP)
  
  Keywords: logicization, algorithmization, cybernettization, inventics, innovation.

Researches are organized in the centre New system of intelligent motion of the electric machines.

FIELD DESCRIPTION

Electric machines modeling including saturation and frequency effect both in the lumped parameter or distributed parameter (field distribution) forms are paramount for global optimization design and new computer - aided testing and parameter identification methods, modeling and simulation.

ACTIVITIES AND RESULTS

Since 1980 aggressive theoretical and experimental work on ever better electric machine modeling, simulation, optimal design, testing and parameter identification has been taking place with the results of two U.P.T. codes for optimal design of large power a.c. machines and a few new testing and parameter identification techniques for electric machines. Most of the work resulted in prototypes tested (or built) in cooperation in industrial partners.

Due to the long time collaboration with the Faculty of Automation and Computer Science from Timişoara, in the field of data acquisition systems and digital signal processing, the D-109 Laboratory was affiliated at the research center in automation and computer science.

RESEARCH BENEFICIARIES

Ministry of Hydro-Power plants such are Lotru-Ciunget, Slatina Aval-Drăgănești (hydro reversible generators of 14000 kVA), Iron Gates 1, Râul Mare Retezat (hydrogenerators of 175000 kVA), Turnu-Ruieni (hydrogenerators of 76500 kVA) and Nuclear Power Plant Cernavodă – Unit 2.

External cooperation – design and prototype of a low speed wind generator with HEXATRONIC Inc. – Canada.

RESEARCH TEAM

- Acad. Toma DORDEA
- Prof. dr. eng. Marius BIRIESCU
- Prof. dr. eng. Marius BABESCU
- Prof. dr. eng. Vladimir CREŢU
- Dr. eng. Gheorghe MADESCU, CS II
- Lect. dr. eng. Mihai MICEA
- Eng. Martijn MOT, CS III
- Assoc. prof. dr. eng. Sorin MUŞUROI
- Assoc. prof. dr. eng. Dan NICOLĂ
- Lect. Dr. eng. Ciprian Şorândaru
- Dr. eng. Ilea MICA
- Eng. Marian OCOLIŞAN, CS II
- Assoc. prof. dr. eng. Dan NICOLĂ
- Lect. Dr. eng. Ciprian Şorândaru
- Dr. eng. Ilea MICA
- Eng. Marian OCOLIŞAN, CS II
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- Lect. Dr. eng. Ciprian Şorândaru
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- Assoc. prof. dr. eng. Dan NICOLĂ
- Lect. Dr. eng. Ciprian Şorândaru
- Dr. eng. Ilea MICA
- Eng. Marian OCOLIŞAN, CS II

RESEARCH OFFERS

Advanced design methods of large a.c. machines including saturation and frequency effects, coupled with dynamic simulation, advanced design methods for ultrahigh torque induction motors, new design methods for capacitor induction motors, computer - aided parameters identification - software and hardware - for electric machines, consulting on large power electric machines design and testing. Consulting regarding optimization, efficiency improvement testing procedures and refurbishment of hydro-generators.

CONTACT PERSON

Prof. dr. eng. Marius BIRIESCU
E-mail: marius.biriescu@et.upt.ro

Researches in INTELLIGENT MOTION CONTROL

FIELD DESCRIPTION

Intelligent motion control integrates motors, static power converters, digital controllers, sensors in systems that perform industrial motion automation with high efficiency (low losses).

ACTIVITIES AND RESULTS

Research activities on linear and rotary motors & drives since 1975 with numerous prototypes built and
tested. Integration of intelligent motion systems in Romanian industries up to 2000 kW units since 1994. Various applications of power electronics in energy conversion and digital control concerned with: wind and hydraulic energy conversion systems into electric energy by means of variable speed operation, starter-alternators with digital control designed for hybrid and electric vehicles, and PM machines-based digital control systems up to 150 rpm

**Research Beneficiaries**
Various Romanian industrial companies such as: Beespeed Automatizări Timișoara, UCM Reșița, Azomures Tg. Mureș, Aquatim Timisoara, SE Iernut, Electrocentrale Deva, CNCSIS, ANSTI etc.

External co-operations: Aalborg University Denmark, EBM Papst Germany, Casino University Italy

**Research Team**
- Prof. dr. eng. Ion BOLDEA
- Assoc. Prof. dr. eng. Nicolae MUNTEAN
- Assoc. Prof. dr. eng. Lucian TUTELEA
- Lect. dr. eng. Cristian LASCU
- Lect. dr. eng. Lucian Miheț - POPA
- Ph.D. Student Răzvan ANCUȚI
- Ph.D. Student Marius FĂTU
- Ph.D. Student Sorin AGARLIȚĂ
- Ph.D. Student Lucian CIBU
- Ph.D. Student Codruța PAICU
- Ph.D. Student Vlad GRĂDINARU
- Ph.D. Student Robert ANTAL
- Ph.D. Student Alin ŞTIRBAN
- Ph.D. Student Liviu IEPURE

**Research Offers**
**Hardware:** Integration of intelligent motion control systems in various industries (automotive electric actuators and renewable electric energy converters are key subjects of interest) from process identification to commissioning and service. Prototyping of new systems for given specifications.

**Software:** Electric motor - linear and rotary - design software aids in the form as software licensed products by request.

**Research in Switched Reluctance Motor Drives**
**Field description**
Switched reluctance motor (SRM) is a position-controlled power stepper motor with a very rugged topology and low costs but requires a specific static power converter and digital controller. Numerous potential applications in harsh environments look adequate for this kind of drive which drew world-wide attention in the last 10 years.

**Activities and Results**
The actual activity aims at introducing the modeling, simulation and validation of the permanent and dynamic performances of the SR Drives

**Research Team**
- Prof. dr. eng. Gheorghe ATANASIU
- Prof. dr. eng. Dorin POPOVICI
- Lect. dr. eng. Alin ARGEȘEANU
- Lect. dr. eng. Ciprian SORĂNDARU
- Assist. eng. Octavian CORNEA
- Assist. eng. Valeriu OLĂRESCU
- Ph.D. Student Marcus SVOBODA

**Research Offers**
New drives with SRMs - from research to prototyping for various applications at variable speed, digital control of industrial drives with static power converters, medium power variable frequency motor drives (research and consulting)

**Contact Person:**
Prof. dr. eng. Dorin POPOVICI
E-mail: dorin.popovici@et.upt.ro

**Researches in Power Industrial Electric Drives**
**Field Description**
Power electric drives with variable speed are useful to increase productivity and quality in various processes
and require means for speed control invariably. The load requirements are very specific and the best solution depends notably on the application.

ACTIVITIES AND RESULTS
Since 1980, with emphasis on overhead cranes using various static power converters, research efforts have been developed to define, design, built and test power drives with variable speed. New design methods and converter realizations have been obtained both with rotary or linear motors.

RESEARCH BENEFICIARIES
Mechanical works Timisoara, Ministry of Education, PROMPT Research Institute.

RESEARCH TEAM
➢ Prof. dr. eng. Eugen SERACIN
➢ Prof. dr. eng. Dorin POPOVICI
➢ Assoc. prof. dr. eng. Sorin MUȘUROI
➢ Assoc. prof. dr. eng. Ioan GHIUR
➢ Lect. Dr. eng. Ciprian ȘORÂNDARU
➢ Lect. Dr. Eng. Cristian LĂSCĂU
➢ Ph.D. Student Marcus SVOBODA

RESEARCH OFFERS
Optimal design methods for power industrial drives, current inverter power drives, linear motors conveyors.

CONTACT PERSON
Assoc. prof. dr. eng. Sorin MUȘUROI
E-mail: sorin.musuroi@et.utp.ro

Main publications

FIELD DESCRIPTION
Modern lighting sources and lighting devices, optimal lighting design, power electronics for electronic lighting, electrotechnologies - based on electromagnetic or electrostatic fields are widely used in the fabrications manufacturing systems and include electrothermal processes, welding power sources, ultrasonic electronics, electrostatic etching etc.

ACTIVITIES AND RESULTS
Since 1980 notable research efforts have been devoted to investigate induction - the welding process and the power sources, new electric welding and ultrasonic power electronics sources. A few prototypes have been built and tested. New researches have been oriented to ultrasonic enhancement of liquid magnetic processing and sonosynthesis of nano-materials.

RESEARCH BENEFICIARIES
Ministry of Research, ISIM Timișoara

RESEARCH TEAM
➢ Prof. dr. eng. Ioan ȘORA
➢ Assoc. prof. dr. eng. Dan NICOARĂ
➢ Assoc. prof. dr. eng. Alexandru HEDEȘ

RESEARCH OFFERS
Power electronics, for electrotechnologies, including high-frequency power transformers, arc welding power sources, advanced power electronics ultrasonics sources (from research to prototyping), ultrasonic processing of materials, consulting in electrotechnologies and electric lighting devices.


18. Miheț-Popa, L., Nicoară, D., Strategii de comandă și control ale turbinelor de vânt de mare putere, Buletinul AGIR, nr.3, 2007


22. Şorăndaru, C., Svoboda, M., Muşuroi, S., Popovici, D., Electrical drive systems with vectorial control for the induction motors


41. Pănoiu, M., Pănoiu, C., Şora, I., Osaci, M., Simulations results on the reactive compensation process on electric arc furnace


45. Pănoiu, M., Pănoiu, C., Şora, I., Osaci, M., About the possibility of power controlling in the three phase electric arc furnaces using PSCAD-EMTDC simulation program, Advances in Electrical and Computer Engineering, vol. 7, nr. 1 (27), 2007, ISSN 1582-7446


RESEARCH GRANTS

2. Tutelea, L., Actionări electrice noi pentru refrigera - creșterea eficienței energetice cu cost redu, Theme 18, Cod 357, CNCSIS
3. Boldea I., Muntean N., Tutelea L., Tehnologii noi de acutatoare electrice pentru automobile, CEEX X2C33
4. Biriescu, M., Mădescu, Gh., Moţ, M., Optimizarea funcţionării hidrogeneratoarelor electrice prin modernizarea sistemelor de excitaţie în vederea creşterii eficienţei energetice şi competitivităţii lor, PNCDI 2, nr. 21028

PhD THESIS DEFENDED

1. Olărescu V., Sisteme de acţionări electrice performante ce utilizează maşina sincronă cu magnetsi permanenţi în comutaţie statică, PhD supervisor: Prof.dr.eng. Gh. Atanasiu
2. Cornea, O., Strategii de comandă a motorului sincron cu reluctanţă variabilă şi comutaţie secvenţială în acţionări electrice, PhD supervisor: Prof. dr. eng. Gh. Atanasiu
3. Bobăianu A., Optimizarea maşinilor de inducţie cu rotorul în scurtcircuit cuplate cu convertoare, PhD supervisor: Acad. Toma Dordea

CONTACT
Prof.dr.eng. Dorin POPOVICI, Head of Department 2, Vasile Pârvan Blvd. 300223, Timişoara, Romania
Tel/Fax: +40-256-403451 Tel: +40-256-403452 Email: dorin.popovici@et.upt.ro Web: http://www.et.upt.ro
DEPARTMENT OF POWER ENGINEERING

MAIN RESEARCH FIELDS

- Electromagnetic Compatibility in Power Systems
  
  **Keywords:** electromagnetic field, environment, disturbance source, electromagnetic interference

- High Voltage Laboratory Tests and Quality Checking
  
  **Keywords:** high voltage technique, overvoltages, testing record

- Modeling and Simulation of Electromagnetic Transients in Power Systems
  
  **Keywords:** switching and lightning, overvoltages, transient response, simulation

- Power System Reliability
  
  **Keywords:** loss of load probability, power system reliability, probability density function

- Power Apparatus and Equipments
  
  **Keywords:** power apparatus, electrical equipment, switching devices, protection devices

- Power Quality
  
  **Keywords:** harmonic analysis, data acquisition, computer aided statistical research

- Load forecasting
  
  **Keywords:** energy forecasting, expert system

- Power System Restructuring
  
  **Keywords:** power system, energy pool, transmission open access, ancillary services, independent system operator

- Power System Transient Stability and Voltage Stability
  
  **Keywords:** power systems, power systems stability, transient stability, voltage stability

- Electrical Materials
  
  **Keywords:** ferromagnetic materials, hysteresis loop, transformer iron core, non-linear analyses methods

- Electrical substations and Power plants
  
  **Keywords:** electrical energy production, power transformer, switching devices, protection devices, secondary circuits

- Energy management
  
  **Keywords:** energy efficiency, energy management systems, project feasibility

Researches in ELECTROMAGNETIC COMPATIBILITY IN POWER SYSTEMS

**FIELD DESCRIPTION**

Electromagnetically disturbances analysis produced by high and low perturbation sources; coupling mode between sources and victims and against perturbation action to protect the energetically field receptors analyses.

**ACTIVITIES AND RESULTS**

Over-voltage protection equipments, using ZnO varistors

Mathematics modeling and measurements of induced voltages in two-line circuit and adjacent circuits

**RESEARCH TEAM**

- Prof. dr. eng. Flavius Dan ŞURIANU
- Prof. dr. eng. Viorel TITIHÂZAN
- Lect dr. eng. Ilona BUCATARIU

Researches in HIGH VOLTAGE LABORATORY TESTS AND QUALITY CHECKING

**FIELD DESCRIPTION**

The purpose of high voltage tests consists of certifying the quality of insulation systems and emitting testing bulletins, optimal computation and experimental testing of insulation disturbance location and characteristic parameters measuring.

**ACTIVITIES AND RESULTS**

Tests on sparkover voltages (high voltages resistance variable arresters).

Tests on insulators of glass and composite insulators for a.c. overhead lines (Un > 1000 V).

Tests on medium voltage 20 kV steel-aluminum conductor insulated with XLPE.

Tests on insulation of welding equipment.

**RESEARCH TEAM**

- Prof. dr. eng. Flavius Dan ŞURIANU
- Assoc. prof. dr. eng. Viorel TITIHÂZAN
- Assoc. prof. dr. eng. Adrian PANĂ
- Lect dr. eng. Mariana TITIHÂZAN

Researches in MODELING AND SIMULATION OF ELECTROMAGNETIC TRANSIENTS IN POWER SYSTEMS

**FIELD DESCRIPTION**

Studies present the statistical results of a switching or a lightning overvoltage performed on electromagnetic transients. The probability of shielding failures and backflashover have been evaluated and compared to the characteristics of transmission lines in service.

Overvoltages caused by line energization, single and three phase reclosing have been investigated by statistical approach using ATP - EMTP.

**ACTIVITIES AND RESULTS**

In scientific research programs several models have been developed for calculation of switching or lightning overvoltages.

**RESEARCH TEAM**

- Prof. dr. eng. Corneliu VELICESCU
- Assoc. prof. dr. eng. Gheorghe VUC
PhD Student Daniel DONDERA
PhD Student Răzvan POPA

**RESEARCH OFFERS**
Power systems transients - modeling and simulation
Power systems reliability studies
Transformer iron core, non-linear analyses methods.

**Researches in POWER SYSTEMS RELIABILITY**

**FIELD DESCRIPTION**
The research presents for different power systems configuration the probable energy value, which cannot be supplied and the loss of load probability. To obtain the probability density function the different probabilistic models are used like Gram-Charlier expansion or Monte Carlo simulation.

**RESEARCH TEAM**
- Prof. dr. eng. Corneliu VELICESCU
- Prof. dr. eng. Mircea NEMEŞ
- PhD Student Daniel DONDERA
- PhD Student Răzvan POPA
- PhD Student Oana POP

**RESEARCH OFFERS**
Reliability evaluation of power system extension

**Researches in POWER APPARATUS AND EQUIPMENT**

**FIELD DESCRIPTION**
There are a very large category of electrical systems, which include all type of switching devices (from Low to High Voltage), all the equipment existing in power stations, protection systems (surge arresters, current protections), automatic equipment (relays, contactors), power electronic devices and digital command equipment (such as PLC-s).

**ACTIVITIES AND RESULTS**
Design of new electrical switching devices, equipment and installations
PCL’s implementation for different applications
Software for digital command equipment
On-line systems for monitoring and diagnosis of electrical equipment

**RESEARCH TEAM**
- Prof. dr. eng. Alexandru VASILIJEVICI
- Prof. dr. eng. Iuliu DELESEA
- Prof. dr. eng. Petru ANDEA
- Assoc. prof. dr. eng. Doru VĂTĂU
- Lect. dr. eng. Flaviu FRIGURĂ

**Researches in POWER QUALITY**

**FIELD DESCRIPTION**
Analysis of harmonics, unsymmetrical operations; equivalent parameter measurements for harmonic frequencies; evaluation of static reactive power compensation; control of passive power filter in electrical distribution systems.

**ACTIVITIES AND RESULTS**
Measurements were made in substations for Romanian National Electricity Company. A complex digital data acquisition system was used for the statistical estimation of harmonic distortion and unsymmetrical operation. New solutions were developed for the improvement of power quality in distribution systems.

**RESEARCH TEAM**
- Prof. dr. eng. Vasile DUŞA
- Prof. dr. eng. Petru GHEJU
- Assoc. prof. dr. eng. Adrian PANĂ
- Lect. dr. eng. Ilona BUCATARIU

**RESEARCH OFFERS**
Measurement and characterization of harmonic distortion for large industrial loads, location of harmonics in power systems, estimation effects for harmonics and unbalanced load on power system’s equipment, analysis of power quality.

**Researches in LOAD FORECASTING**

**FIELD DESCRIPTION**
Analysis of electrical energy and power need for short and mid-term load forecasting; algorithm and program development for monthly energy consumption and daily load curves.

**ACTIVITIES AND RESULTS**
Electrical load data acquisition from “Electrica Banat” substations and data files processing. Development of PRENPS and PELTMRNA programs for short-term daily load curve forecasting, respectively for mid-term monthly load forecasting.
Result analysis and forecast validation.

![Load Forecast Software](LoadForecastSoftware.png)
PhD Student Constantin BÂRBULESCU
PhD Student Dan JIGORIA-OPREA

RESEARCH OFFERS
Short-term energy and load curve forecasting. Expert systems for the checking of used database at forecasting.

Researches in POWER SYSTEM RESTRUCTURING

FIELD DESCRIPTION
The unprecedented world-wide restructuring of the power industry move away from the traditional monopolies and toward greater competition, in the form an increased members of independent power producers and an unbundling of the main services that were until now provided by the utilities, has been building up for over a decade.

ACTIVITIES AND RESULTS
Managing risk on new market power and price stability
Pricing of network access

RESEARCH TEAM
⇒ Prof. dr. eng. Mircea NEMEȘ
⇒ Prof. dr. eng. Corneliu VELICESCU
⇒ Assoc. prof. dr. eng. Gheorghe VUC
⇒ Assoc. prof. dr. mat. Doru PĂUNESCU
⇒ Eng. Oana POP

RESEARCH OFFERS
Digital model of power system
Optimal Power Price Simulator (OPP)

Researches in POWER SYSTEM TRANSIENT STABILITY AND VOLTAGE STABILITY

FIELD DESCRIPTION
Computer aided analysis and improvement of the stability of the electric power system (transient stability, dynamic stability and voltage stability). New control technique for stability improvement. Developing of the master studies in these fields.

ACTIVITIES AND RESULTS
Advanced software for stability analysis

New control techniques for the improvement of the dynamic behavior of synchronous generators
PHARE postgraduate and PhD program

RESEARCH TEAM
⇒ Prof. dr. eng. Ştefan PREITL
⇒ Prof. dr. eng. Bucur LUŞTREA
⇒ Prof. dr. eng. Radu Emil PRECUP
⇒ Lect. dr. eng. Ioan BORLEA
⇒ Phd. Student Constantin BÂRBULESCU
⇒ Phd. Student Dan JIGORIA-OPREA

RESEARCH OFFERS
Software for stability analysis and improvement
Studies concerning dynamic behavior of power systems
Advanced control techniques for transient and voltage stability improvement

Researches in APPLIED NON-LINEAR MODELING OF FERROMAGNETIC MATERIALS

FIELD DESCRIPTION
The modeling of non linear transformer iron core considered the hysteresis loop. Modeling methods for establishment and validation. Estimation of the transformer behavior under symmetrical (sinusoidal and non-sinusoidal) and asymmetrical supply conditions. Analyses the main quantities. Iron core losses harmonic analyses.

ACTIVITIES AND RESULTS
Measurements were performed in the “National Research Center for Welding and Material Trials-ISIM” and the “Power Energy Department” laboratories. A complex digital system was used for data acquisition and harmonics analyze of the transformer currents and tension for different supply conditions. The proposed transformer model was implemented into a welding machine and validated (comparison between the simulated and the measured results showed a very good agreement). Simulations were performed over in order to estimate the welding performances over a wide range of condition defined through: different firing pulse angle, materials, forms and thickness of welding pieces.

RESEARCH TEAM
⇒ Assoc. prof. dr. eng. Doru VĂTĂU
⇒ Lect. Eng. dr. Flaviu FRIGURĂ

RESEARCH OFFERS
Modeling single-phase transformers and equipment with ferromagnetic core.

Estimation of electromagnetic quantities: time variation shape, r.m.s., peak values, harmonic analyze over a wide range of conditions.
Time and frequency analysis of electromagnetic quantities.

Behavioral analysis of a complex system containing a transformer or an apparatus.

Iron core power losses detailed analysis.

**Researches in ELECTRICAL SUBSTATIONS AND POWER PLANTS**

**FIELD DESCRIPTION**
Constructive solutions optimization used for electrical equipments and installations in electrical substations, operating principles and general characteristic optimization for the reliability and system management improvement.

Specific problems of planning for the electrical network operating control and command.

**ACTIVITIES AND RESULTS**
Solutions for the electrical substation auxiliaries supplying from the 220/110 kV autotransformer tertiary. Development of an expert system which offer informational support for substation operating recovery, which following a failure, that monitor continually all functions needed by protection and control and which come in to support for operating personnel.

**RESEARCH TEAM**
- Prof. dr. eng. Petru GHEJU
- Prof. dr. eng. Vasile DUŞA
- Prof. dr. eng. Bucur LUŞTREA
- Lect. dr. eng Ioan BORLEA
- Lect. dr. eng Ilona MOLNAR-MATEI
- Phd. Student Florin BĂLOI

**RESEARCH OFFERS**
The opportunity analysis of the implementation intelligent systems needed for filtering, cataloguing and store of the information provided from the protection and control systems in the electrical substations for substation remote control.

**Researches in ENERGY MANAGEMENT**

**FIELD DESCRIPTION**
Energy audit, energy management are the only means for sustainable energy use and best economical performance in entire society.

**ACTIVITIES AND RESULTS**
Measurements audit were made in substations for “Transelectrica” National Transmission Company. Were realized feasibilities studies for new solutions in auxiliary services supplying and for public lightning systems energy efficiency improvement.

**RESEARCH TEAM**
- Prof. dr. eng. Flavius Dan ŞURIANU
- Assoc. prof. dr. eng. Gheorghe VUC
- Assoc. prof. dr. eng. Dan NICOARA
- Assoc. prof. dr. eng. Alexandru HEDES

**RESEARCH OFFERS**
Feasibility studies for energy efficiency projects, energy audits, energy policies advising.

**PUBLICATIONS**

**BOOKS**

**PUBLISHED PAPERS**


15. Șurianu, F.D., An apparatus for signalizing the induced currents in the disconnected circuits of double circuit h.v. overhead lines, Scientific Bulletin of the “Politehnica” University of Timisoara, Trans. on Power Systems, Tom 52(66), Proceedings 7th Int. Power Systems Conference, Timişoara, 22-23 November 2007, pp. 615-620, ISSN 1582-7194


19. Ardelean, I., Bârbulescu, C., Vuc, G., Borlea, I., Kilyeni, Șt., Technical and financial feasibility of using fuel cells as back up source


34. Dondera, D., Popa, R., Velicescu, C., The Multi-Area Systems Reliability Estimation Using Probabilistic Load Flow by Gramm-


RESEARCH GRANTS

1. Frigură-Iliasa, F.M., Operating performances improvement of over voltage protection equipment based on ZnO varistors for low voltage applications, Grant CEEEX, type ET, Cod 33, 2006-2008

2. Şurianu, F.D., Duşa, V., Bucătăriu, I., Study concerning the mobile short-circuits section establishment method taking into consideration the new type of protections existing in substations operated by Transelectrica, September 2007, C.N.E.E. Transelectrica S.A., Transmission Branch Timişoara, Nr. 85 / 726 / 01.08.2007

3. Şurianu, F.D., Study concerning the mobile short-circuits section establishment method taking into consideration the new type of protections existing in substations operated by Transelectrica, September 2007, C.N.E.E. Transelectrica S.A., Transmission Branch Timişoara, Nr. 85 / 726 / 01.08.2007


5. Borlea, I., Study about fuel cell compatibility with substation auxiliary services regimes, September 2007, C.N.E.E. Transelectrica S.A., Transmission Branch Timişoara, 56/07.05.2007, BC 659/16.05.2007

6. Duşa, V., Short circuit currents calculus in Timişoara 220 kV Substation for establish the auxiliary services supplying from AT tertiary, September 2007, C.N.E.E. Transelectrica S.A., Transmission Branch Timişoara, UPT 613 / 06.03.2007


PhD THESIS DEFENDED


2. Stănescu, C.G., Contributions regarding the electrical energy quality monitoring at the interface between transmission network and the distribution one, 4 May 2007, Scientific supervisor: prof.dr.eng. Al. Vasilievici

<table>
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<th>CONTACT</th>
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<tbody>
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<td>Prof. dr. eng. Flavius Dan ŞURIANU</td>
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<td>Email: <a href="mailto:catee@et.upt.ro">catee@et.upt.ro</a></td>
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