Department of Electrical Drives

Annual Report 1992

Department of Electrical Drives
Faculty of Electrical Engineering
TECHNICAL UNIVERSITY
Letná 9
042 00 KOŠICE
Slovak Republic

Telephones: (+49)-(95)-331 12 — Secretariat of the Department
                      -331 12 — Electrical Drives and Power
                                 Electronics Divisions
                      -234 77 — Electrical Machines and Apparatus
                                 Division
                      -281 32 — Motion and Process Control Technology
                      -238 22   Division
Fax: (+49)-(95)-238 22 — " — "
                      -231 55 — Motion and Process Control Technology
                                 Division
Telex: 77 410 (TU KO,CS)

Contents

1. Foreword

The Department of Electrical Drives is one of the largest departments of the Faculty of Electrical Engineering. It was created in 1969 from the original Department of General Electrotechnics which was a part of the Faculty of Mechanical Engineering from 1953. The Department is responsible for education in the field of Electrical Engineering. The main aim is to prepare students for careers in industry and for research. The Department offers Master of Science and Doctor of Philosophy degrees.

The Department has 34 full academic staff, 6 researchers and 10 support staff.

The research carried out at the Department of Electrical Drives, covers a broad field of interest. It is concentrated on controllable electrical drives, power electronics converters with improved dynamic properties, applicability studies of control theories to the control of complicated drives (multi-motor drives of manufacturing lines, drives of robots and manipulators) an on microcomputer implementation of control algorithms and their hardware realization.

2. Faculty

Head   Assoc.Prof. Jozef Fedor Ph..D.

Division of Electrical Drives

Chief: Prof. Ladislav Zboray Ph.D.
Members: Prof. Jaroslav Timko Ph.D.
          Assoc.Prof. Ján Fetyko Ph.D.
          Assoc.Prof. Jaroslav Tomko Ph.D.
          Assist.Prof. František Ďurovský
          Assist.Prof. Stanislav Pčola
          Assist.Prof. Marcela Halušková Ph.D.
                    Ľudovít Višnyi   - research worker
                    Miroslav Nagy Ph.D. - research worker
                    Karol Daubner   - Ph.D. Student

Division of Power Electronics

Chief: Assoc.Prof.   Jozef Ondera Ph.D.
Members: Assoc.Prof.   Imrich Pokorný Ph.D.
           Assoc.Prof.   Juraj Oetter Ph.D.
           Assoc.Prof.   Jaroslav Dudrík Ph.D.
           Assist.Prof. Irena Kováčová Ph.D.
           Assist.Prof. Jaroslav Kinlovič
                         František Magyar Ph.D. – research worker
                         Peter Višnyi Ph.D.   – research worker
                         Rastislav Uhrín   – Ph.D student

Division of Electrical Machines and Apparatus

Chief: Assist.Prof. Pavol Struckel
Members: Assoc.Prof.   Jozef Fedor Ph.D.
           Assoc.Prof.   Michal Kostelný Ph.D.
           Assist.Prof. Želmíra Ferková
           Assist.Prof. Bartolomej Fedor Ph.D.
           Assist.Prof. Pavol Záskalický Ph.D.
           Assist.Prof. Ján Kaňuch
                         Marián Kerestúri   – Ph.D.Student
                         Miroslav Tvrdoň   – Ph.D.Student
                         Vladimír Kolcun   – Ph.D.Student

Division of Motion and Process Control Technology

Chief: Assoc.Prof.   Michal Girman Ph.D.
Members: Assoc.Prof.   Viliam Fedák Ph.D.
           Assoc.Prof.   Pavol Fedor Ph.D.
           Assist.Prof. Juraj Haluška Ph.D.
           Assist.Prof. Ladislav Kiovský
           Assist.Prof. Stanislav Fedor
           Assist.Prof. Daniela Perduková
                         Rastislav Harčarufka   – research worker
                         Peter Bober   – Ph.D.Student
                         Peter Košč   – Ph.D.Student
                         Jaroslav Maxim   – Ph.D.Student
                         Do Quoc Vu   – Ph.D.Student

Division of General Electrotechnics

Chief: Assist.Prof.Stanislav Kovalčin Ph.D.

Members: Assist.Prof.Juraj Németh
           Assist.Prof.Eva Dobošová
           Assist.Prof.Dionýz Milly Ph.D.
           Assist.Prof.Vladislav Maxim
           Assist.Prof.Vladimír Rožek
           Assist.Prof.Jarmila Žilková

Note: Division of General Electrotechnics is responsible for education of electrotechnics at the other faculties of Technical University.

Other members: Mária Ritóková   – technician
                      Katarína Gočová   – technician
                      Veronika Majerníková   – secretary
                      Viera Svetozarovova   – technician
                      Branislav Tresa   – technician
                      Peter Hajduk   – technician
                      Anton Nagy   – technician
                      Vasil Graban   – technician
                      Soňa Juhásová   – technician

3. *Plans of Study*

The Department of Electrical Drives is directed towards education in the field of Electrical Engineering. In the first two years of study a wide basic knowledge of engineering is given to students at other departments of faculty and university. The specialization is realized in the third, fourth and fifth years of study when students are taught directly under the quidance of the dapartment. The students may choose one of four specialized lines of study at the department:

1. Electrical Drives
2. Power Electronics
3. Electrical Machines and Apparatus
4. Motion and Process Control Technology

1. Electical Drives . The students are prapared for the design and operation of electrical drives used for the drive of various working machines and mechanisms. During the study period the students are made acquainted with a knowledge of power and and control electronics and computer technics.

2. Power Electronics . Besides the basic subjects the students are prepared for the investigation, construction and design of power semiconductor converters, control technique and the control and modelling of converters.

3. Electrical Machines and Apparatus. In the framework of this program, the students are taught the theory, design, technology and construction of electrical machines and apparatus using computer - aided design methods.

4. Motion and Process Control Technology
The stress is focused on the subjects concerning electronics, control theory, computer technics, control and regulation of motion systems and design of control system.

5. Subjects given by Department in 1992

Third year of study

Specialization: Electrical Drives
Power Electronics
Electrical Machines and Apparatus

Subjects	Winter Semester	Summer semester	Lecturer
ED300 Electrical Machines I.(4/3)	x		Kostelný
ED310 Power Electronics (3/4)	x		Dudrík

ED330 Computer in Electrical Engineering (2/3)	x		Girman
ED301 Electrical Machines II.(2/3)		x	Kostelný
ED312 Electronics (4/3)		x	Kováčová I.
ED336 Applied Electronics (2/2)		x	Haluška

Specialization: Motion and Process Control Technology

Subjects	Winter semester	Summer semester	Lecturer
ED311 Power Electronics (3/3)	x		Dudrík
ED331 Electronics (3/3)	x		Kiovský
ED332 Cotrol Systems Software I.(2/2)	x		Harčarufka
ED334 Individual Project (0/4)	x		-
ED302 Electrical Machines for Automatization (3/3)		x	Kostelný
ED333 Control Systems Software II.(2/2)		x	Harčarufka
ED335 Microelectronics (3/3)		x	Haluška

Fourth year of study

Specialization:Electrical Machines and Apparatus

Subjects	Winter Semester	Summer Semester	Lecturer
ED400 Electrical Apparatus (3/3)	x		Fedor J.
ED401 Electrical Machines Design I.(4/2)	x		Struckel
ED420 Electrical Drives (4/4)	x		Timko
ED402 Electrical Machines Design II.(4/2)		x	Struckel
ED403 Electrical Apparatus Design (4/3)		x	Fedor J.
ED404 Individual Project (0/3)			-
ED435 Computer Aided Design (2/3)		x	Fedor,S.

Specialization: Power Electronics

Subjects	Winter Semester	Summer Semester	Lecturer
ED400 Electrical Apparatus (3/3)	x		Fedor,J.
ED410 Control Electronics (3/3)	x		Oetter
ED420 Electrical Drives (4/4)	x		Timko
ED411 Power Electronics I. (3/3)		x	Ondera
ED412 Microcomputer Control of Converters (2/2)		x	Višnyi,P.
ED425 Variable Speed Drives for Automation (4/3)		x	Tomko
ED435 Computer Aided Design (2/2)		x	Fedor,S.

Specialization: Electrical Drives

Subjects	Winter Semester	Summer Semester	Lecturer
ED400 Electrical Apparatus (3/3)	x		Fedor,J.
ED420 Electrical Drives (4/4)	x		Tmko
ED442 Special Parts from Control (3/3)	x		Zboray
ED414 Electrical Drives Design (3/3)		x	Pokorný
ED421 Variable Speed Drives (4/3)		x	Zboray
ED423 Individual Project (0/3)		x	-
ED412 Microcomputer Control of Converters (2/2)		x	Višnyi P.
ED435 Computer Aided Design (2/2)		x	Fedor S.

Specialization: Motion and Process Control Technology

Subjects	Winter Semester	Summer Semester	Lecturer
ED420 Electrical Drives (4/4)	x		Timko
ED431 Modelling of Drive Systems (2/2)	x		Fedor P.

ED430 Control System Design (3/3)	x		Haluška
ED422 Special Parts of Control (3/3)	x		Zboray
ED432 Control Elements of Electrical Drives (2/3)		x	Fedor P.
ED433 Production Processes Identification (2/3)		x	Fedák V.
ED421 Variable Speed Drives (4/3)		x	Zboray
ED434 Control Electronic Circuits		x	Kiovský
ED435 Computer Aided Design (2/2)		x	Fedor S.

Fifth year of study

Specialization: Electrical Machines and Apparatus

Subjects	Winter Semester	Summer Semester	Lecturer
ED500 Electrical Machines Production (3/3)	x		Mihok
ED501 CAD of Electrical Machines (2/3)	x		Struckel
ED504 Diploma seminar (0/3)	x		-
ED502 Special Machines and Apparatus (2/2)	x		Kostelný
ED550 Master Thesis (Diploma Work)		x	-

Specialization: Power Electronics

Subjects	Winter Semester	Summer Semester	Lecturer
ED510 Power Electronics II. (2/3)	x		Ondera
ED511 Semiconductor Converters Disign (3/4)	x		Pokorný
ED512 Diploma seminar (0/3)	x		-
ED521 Selected Industrial Drives (2/2)	x		Tomko,Fetyko
ED550 Master Thesis (Diploma Work)		x	-

Specialization: Electrical Drives

Subjects	Winter Semester	Summer Semester	Lecturer
ED520 Control of Robots and Manipulators (3/2)	x		Fetyko
ED530 Control of Complex Drive Systems (3/3)	x		Fedák,V.
ED522 Diploma seminar (0/3)	x		-
ED521 Selected Industrial Drives (2/2)	x		Tomko,Fetyko
ED550 Master Thesis (Diploma Work)		x	-

Specialization: Motion and Process Control Technology

Subjects	Winter Semester	Summer Semester	Lecturer
ED530 Control of Complex Drive System (3/3)	x		Fedák,V.
ED531 Control Systems of Technological Plants (2/3)	x		Girman,M.
ED532 Technology of Electrical Devices (2/2)	x		Fedor,S.
ED533 Diploma seminar (0/2)	x		-
ED520 Control of Robots and Manipulators (3/2)	x		Fetyko
ED521 Selected Industrial Drives (2/2)	x		Tomko,Fetyko
ED550 Master Thesis (Diploma Work)	x		-

4. Research projects

Following current research projects are carried out at the Department of Electrical Drives for the period 1991-93.

1. State control of electrical drives

2. Progressive control of AC electric drives fed by power semiconductor frequency converters

3. Software and hardware development of distributed control systems for multimotor drives and drive complexes

4. Modern types of AC drives

1. <u>State control of electrical drives</u>
   Research activity of this group is concentrated on:
   - State control design for nonlinear systems
   - Nonlinear observer design for electrical drives
   - Variable structure state control of drives
   - Control of the two-mass drive system with elastic coupling
   - State control of robot servosystems

Associated Faculty: <u>Ladislav Zboray</u>, Jaroslav Tomko, Ján Fetyko, Marcela Halušková, Stanislav Pčola, František Ďurovský, Juraj Németh, Miroslav Nagy, Ľudovít Višnyi, Karol Daubner, Peter Hajduk

Presentation of achieved results:

- State control of a dc series motor (realization)
- State control with observer for a CSI-fed asynchronous motor (partly realized)
- State control with observer for an asynchronous motor by means of stator current and rotor frequency (design and simulation)
- Microprocessor based control of coiler (control algorithm checked on the system model)
- Control design for a vibration mill (patent prepared)

- Realization of two transducer types: frequency to voltage and frequency to binary code
- Position control for a robot by means of dynamic model and by trajectories optimalization (design)

Relevant publications (see section 6 "Publications")
[1],[4],[5],[6],[9],[13],[14],[22],[25],[26],[27],[31]

2. Progressive Control of AC electric drives fed by power semiconductor frequency converters
   Supporfed by Ministry of Education, Grant No 1/282/92

Research activity of this group is focused on:
- Research and development of frequency converters with switched-off power semiconductor devices (bipolar transistors, MOSFETs, IGBTs and GTO thyristors)
- New control structures of AC drives
- Development and construction of laboratory prototypes of power frequency converters
- Realization of laboratory prototypes of control circuits of AC drives

Associated Faculty: Jaroslav Timko, Pavol Fedor, Jozef Ondera, Imrich Pokorný, Peter Bober, Eva Dobošová, Jaroslav Dudrík, Peter Košč, Irena Kováčová, Stanislav Kovalčin, Peter Višnyi, Rastislav Uhrín, Jaroslav Kinlovič, František Martinec, Dobroslav Kováč

Presentation of achieved results:

- Technical realization of the control of asynchronous machine supplied from frequency converter
- Design and simulation of the control structure of AM with adaptive characterics, which is valid to compesate the change of parameters AM with temperature owing to "High Performance Control".
- Simulation and design of the control structure with reference models for control of the mechanical systems with transferrer
- Work with Fuzzy Theory and its application on control of the Electrical Drive and results was verified on DC drive
- One version of the resonant converter was ended
- Designed reserve circuit of the power MOSFEt transistor, made

theoretical analysis of switching process, created and verified new computer model of the MOSFEt for program PSPICE and described universal procedure for optimal switching process of the power MOSFEt
- Voltage frequency convertor was designed and realized
- Designed electrical drive with linear induction motor

Relevant publications (see section 6 "Publications"):
[2],[3],[7],[11],[17],[18],[19],[20],[24],[28],[29],[38],[39]

3. Software and hardware development of distributed control systems for multimotor drives and drive complexes

The project deals with two basic topics:

a) Methodology of control circuit design for one and multi-motor drives, synthesis of regulators for asynchronous motor drives using Ljapunov theory and aplying of Fuzzy regulators to the control of drives.
b) Develop enviroment for control systems based on transputer network
   The subject of this research lies in the design and debugging of software tools for modelling, monitoring and control of complex drive systems.

Associated Faculty: Michal Girman, Viliam Fedák, Pavol Fedor, Juraj Haluška, Ladislav Kiovský, Stanislav Fedor, Daniela Perduková, Rastislav Harčarufka, Peter Bober, Jaroslav Maxim, Peter Košč

Presentation of achieved results:
   The simulation software system has been developed for transputer T800 which is more efficient in comparison with the same simulation programme running on PC.

Relevant publications (see section 6 "Publications"):
[7], [8], [10], [11], [15], [16], [23], [36], [37]

4. Modern types of AC drives
   Research activity of this group is concentrated on:
   - Controlled electrical drive with switched reluctance motor

- Disc steps motor with the axial air gap supplied by the pulse power source
- Analysis of properties of AC drives with new types of converter

Associated Faculty: <u>Jozef Fedor</u>, František Magyar, Juraj Oetter, Michal Kostelný, Bartolomej Fedor, Pavol Struckel, Dionýz Milly, Želmíra Ferková, Vladislav Maxim, Ján Kaňuch, Marián Kerestúri, Miroslav Tvrdoň

Presentation of achieved results:

The research is worked out all the points of the task are being currently solved
- there was realized the reluctance motor $2p_1/2p_2 = 6/4$
- the constructed functional model of transistor converter is at revival phase
- there is finished the electromagnetic design the disc steps motor with the axial air gap.The design and manufacturing of stamping tools were finished.
- there was worked out the theory and carried out the count of exciting components of noise in magnetic field into an air gap of induction motor with non-harmonic voltage
- there were measured output power dependence on switch-on and conduction angles combinations at a transistor voltage converter power supply of the SRM. The possibilities of utilizing the maximum moment and optimal working area are being considered. The article deals also with the SRM working stability and its modelling.

Relevant publications (see section 6 "Publications")
[12],[21],[30],[40]

5. Faculty Essays

Teachers

Jaroslav Timko
Professor
Ph.D., The Technical University of Košice, 1976
His branch specialization is progressive control of AC drives fed by power electronic frequency converters using AC asynchronous machines and linear asynchronous machine

Ladislav Zboray
Professor
Ph.D., The Technical University of Transport and Communications of Žilina, 1964
His research interest includes application of nonlinear state control methods for DC and AC electrical drives

Jaroslav Dudrík
Associate Professor
Ph.D., The Technical University of Košice, 1986
He is interested in area of power electronics. His research work includes analysis and design of static power converters and their control. He has recently busied with high-frequency resonant and soft switching DC-DC converters.

Viliam Fedák
Associate Professor
Ph.D., The Technical University of Košice, 1981
His research in last years has concentrated on the application of the methods of modern multivariable control theory for the control of multi-motor drives. Various methods of the design of centralized and decentralized controllers, robust feedback control including observers have been investigated. Another area of interest concerns the system identification and modelling of drive systems

Jozef Fedor
Associate Professor
Ph.D., The Technical University of Košice, 1981
He works in area of switching electrical circuit and switching apparatus. He is also busy at applications of power semiconductor devices and circuits for a switch technique

Pavol Fedor
Associate Professor
Ph.D., The Technical University of Košice, 1985
Field of his interest is a software for automatization and control system (mainly-real-time-software) and new control methods of electrical drives. Now he works in region of parallel and distributed programming and application software for transporter system

Ján Fetyko
Associate Professor
Ph.D., The Technical University of Košice, 1981
His research interest includes the dynamic approach to motion generation of manipulation robots and the non-adaptive and adaptive control of electrical servosystems for driving industrial robots

Michal Girman
Associate Professor
Ph.D., The Technical University of Košice, 1981
Field of his interest is a software for automation and control systems. Now he works in region of parallel and distributed programming-multitasking on PC&LAH and software for transputer systems

Michal Kostelný
Associate Professor
Ph.D., The Technical University of Košice, 1983
He works in area of electrical machines.

Juraj Oetter
Associate Professor
Ph.D., The Technical University of Košice, 1979
He aims at the new types of power semiconductor converters scientifically. He specializes in the controlling of these mainly. In recent years he has worked in a research of microcomputer controlled tranzistor converters for switched reluctance motors

Jozef Ondera
Associate Professor
Ph.D., The Technical University of Košice, 1985
Field of his interest is design and control of power semiconductor converter. His research in recent years has focused on the solution of direct-current converter.

Imrich Pokorný
Associate Professor
Ph.D., The Technical University of Košice, 1980
His current interest includes inverters with and without DC line. His present research deals with the design of resonance inverters. He studies back influence on feeding line and the content of higher harmonics in the output voltage and current

Jaroslav Tomko
Associate Professor
Ph.D., The Technical University of Košice, 1981
He is specialized in modern methods of electrical drives control, particularly state space control, adaptive systems with time delay and electrical drives for technological lines

Eva Dobošová
Assistant Professor
Her research interests include analysis and control electric power systems. Her primary area of research is control of asynchronous machine

František Ďurovský
Assistant Professor
He is interested in control of electric drives especially state space control, design of observers and creating of control programs for electrical drives

Bartolomej Fedor
Assistant Professor
Ph.D., Moscow Power Engineering Institut, 1985
He works in area of switching electrical circuit and switching apparatus. He is also busy at application of power semiconductor devices and circuits for a switch technique

Stanislav Fedor
Assistant Professor
He is interested in computer control, SMT and Hybrid technology. He has obtained some results in design of measuring instruments for testing and diagnostic of energetic devices

Želmíra Ferková
Assistant Professor
She is specialized in the field of electric machines with orientation on the research of switched reluctance motor

Juraj Haluška
Assistant Professor
Ph.D., The Technical University of Košice, 1988
His interest is in the areas of digital control system, first of all multiple processor systems and reliability of control systems

Marcela Halušková
Assistant Professor
Ph.D.,The Technical University of Košice,1992

Her research interests include variable structure systems, sliding mode operations, control of linear and nonlinear systems which have applications in electrical drives problems

Ján Kaňuch
Assistant Professor
He is interested in design of disk step motor and disk reluctance motor, also application of CAD methods in design of electrical machines and devices

Jaroslav Kinlovič
Assistant professor
He works in area of power electronics. He is interested in frequency converters.

Ladislav Kiovský
Assistant Professor
He is interested in industrial control electronics, especially in microcomputer peripheral electronic devices and interfaces for motion and process control, applications of new types of microcomputers and VLSI circuits like transputer and field programmable gate arrays in automatic control systems, also in microcomputer control of switched reluctance motor drive

Stanislav Kovalčin
Assistant Professor
Ph.D., The Technical University of Košice, 1988
His field of work is power electronics, control of power semiconductor converters by use of microcomputer technics and its application in the industry

Irena Kováčová
Assistant Professor
Ph.D., The Technical University of Košice, 1988
The main direction of her work is power electronics. Her interest is especialy concentrated on the application of power MOSFETs in the circuits of power electronics

Vladislav Maxim
Assistant Professor
His research inferest includes analyses of converters for switched reluctance motors.

Dionýz Milly
Assistant Professor
Ph.D.,The Technical Universtity of Košice,1992
He is specialized in the field of frequency changers with sinusoidal input and ouput currents and control circuits for static power conwerters

Juraj Németh
Assistant Professor
He deals with problems of the models of frequency controlled AC machines, especialy with field vector oriented control and with control of the efficiency and power factor

Stanislav Pčola
Assistant Professor
He works in design and realisation of non-linear controllers of DC series motor and PM synchronous motor

Daniela Perduková
Assistant Professor
She is works on a design method and new control structure for the centralized controller of the multi-motor drive of a production line in which the motors are mechanically coupled by a continuous moving web. Model reference adaptive control systems is synthesized by means of the Ljapunov Second Method. Its priority lies in quick tuning of the simple controller, which secures excellent dynamic properties of the system

Vladimír Rožek
Assistant Professor
He is specialized in modern methods of electric drives control

Pavol Struckel
Assistant Professor
His interest are rotating AC electrical machines, especially magnetic field effects and noise of induction machines. Besides he deals with CAD (Computer Aided Design) at sphere of elecrical machines

Pavol Záskalický
Assistant Professor
Ph.D., The Technical University of Košice, 1984
His field of interest are electrical apparatus and machines

Jaroslava Žilková
Assistant Professor
Her main interests are in the area of theory and practical application of process control

Research Workes

Rastislav Harčarufka
The field of his interest includes the software for automation (technical informatics) in full range. In the next time he wants direct his efforts towards the software for real-time systems with parallel or distributed architecture, based on convetional processors and/or transputers and towards all related products such as CAD, CASE, ...-technologies, parallel programming, languages, etc.

František Magyar
Ph.D., The Technical University of Transport and Communications of Zilina, 1969
His professional interest belongs to power electronics particularty to power converters for controlled AC motor drivings.

Miroslav Nagy
Ph.D., The Technical University of Košice, 1992
His research interests include control of electrical drives state
feedback control, control with an observer, application of
microcomputers to control

Ľudovít Višnyi
He is interested in the field of electronics, computer technic
design applications of special microprocessors and other
integrated circuits at control of electrical drives

Peter Višnyi
Ph.D., The Technical University of Košice, 1983
He is a specialist on digital speed and position control of
electric machines. He is interested especially in extremely high
dynamic performance and precise electrical drives of small power

6. Publications

6.1 Journal Papers

[1] Halušková,M.: Application of sliding modes to DC motor control.
     Elektrotechnický časopis 2/1992 pp.42-44

[2] Kováčová,I.: A new connection of DC power supply.
     Elektrotechnický časopis 5/1992 pp.145-146

[3] Kovalčin,S., Gardoš,M., Klein,M., Varga,L.: Návrh zariadenia na
     meranie krokových dotykových napätí a uzemnení
     v elektroenergetických zariadeniach. Energetika.
     (Design apparatus for measuring step and touch voltage and earth
     in power industory) (in press)

[4] Zboray,L., Ďurovský,.: Control design of an asynchronous motor
     with observer. Elektrotechnický časopis 7/1992, pp.216-219

[5] Zboray,L.: Entwurf einer Zustandsregelung mit
     Systemordnungsreduktion. Automatisierungstechnik 1992, H.1,

     s.37-38.
     (Desing of a state feedback controler with reduction of system
     order)

[6] Zboray,L.: State control design of a VSI-fed asynchronous motor.
     Elektrotechnický časopis 11/1992, pp.341-343

6.2 Conference Papers

[7] Bober,P., Fedor,P.: Model reference position control of a system
     with backlash and elastic characteristics. In.: Proc. of the
     Conference "Motion Control for Intelligent Automation", Perugia
     October 1992, Italy, Vol.II., pp.65-70

[8] Bober,P., Fedor,P., Girman,M., Harčarufka,R.: Project
     GAUS-Benutzerumgebung fur die Entwicklung und Realisation der
     Steuerungssysteme mit Transputer fur technologische
     Produktionssysteme. In.: Proc. of TAT 92 Aachen 1992, Germany,
     pp.34-35
     (Development and enviroment of control system with transputer for
     technological lines)

[9] Ďurovský,F.: Nonlinear observer for induction motor. In.: Proc.
     of the Conference ED&PE, Košice 1992, Vol.I., pp.144-149

[10] Fedák,V., Perduková,D., Fedor,P.: Control of multimotor drive
     with an incomplete access to state variables. In.: Proc. of the
     Conf. ED&PE, Košice 1992, Vol.I., pp.509-514

[11] Fedor,P., Bober,P.: Electric Drive for spark erosion work plant.
     In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.II., pp.302-306

[12] Ferková,Z., Oetter,J.: Switched reluctance motor properties.
     In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.83-86

[13] Fetyko,J.: Position control of robot axis using dynamic model.
     In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.495-499

[14] Fetyko,J.: Robotvezérlési trajektoriák képzése és optimalizálása.
II. Tudományos találkozó Budapest 1992, 231-233
(Trajectories planning and optimalization for robot control)

[15] Girman et.al.: GAUS-Generátor automatizovaných systémov s transputermi. Zborník konf. AS RTP '92, Bratislava 1992, s.90-97
(GAUS-Generator of automatized systems with transputers)

[16] Harčarufka,R.: TurboSIM-an open simulation system for electrical drives. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.II. pp.558-559

[17] Košč,P., Profumo,F.: Adaptive FUZZY logic control for DC motor speed-loop. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.289-296

[18] Kováč,D.: The influence of individual parameters of power and control circuits on the switching process of power MOSFETs. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.271-273

[19] Kováčová,I.: A new model of power MOSFET and its switching. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.268-270

[20] Martinec,F.: Resonant inverters in aircraft electric systems. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.241-244

[21] Milly,D.: A three phase sine-wave-in AC to DC converter with adjustable output voltage and reversible output current. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.248-251

[22] Pčola,S., Zboray,L.: Nonlinear control realization for a DC motor. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.260-262

[23] Perduková,D., Fedák,V., Fedor,P.: Reference model robust control of MIMO system with and incomplete access to state variables. In.: Proc. of the Conf. Motion Control for Inteligent Automation, Perugia, October 1992, Vol.II., pp.83-87

[24] Timko,J., Zilková,J.: Controlled drive with linear induction motor. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.381-383

[25] Tomko,J., Pčola,S., Ďurovský,F.: A microprocessor-based control of coilers. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., p.283-285

[26] Zboray,L.: Control design for an induction motor with observer. In.: Proc. of the Conf. ED&PE, Košice 1992, Vol.I., pp.140-143

6.3 Theses

[27] Halušková,M.: Regulácia pohonu metódou premenných štruktúr v stavovom priestore. (Variable structure drive control in state space)
(Ph.D.thesis - in Slovak), Košice, EF TU 1992, 98p.
Thesis advisor: Prof. Zboray,L.

[28] Kováč,D.: Napäťový menič frekvencie s výkonovými MOSFE tranzistormi pre napájanie asynchrónnych motorov
(Voltage frequency converter with power MOSFET for supplying of asynchronous motors).
(Ph.D. thesis-in Slovak), Košice, EF TU 1992, 156p.
Thesis advisor: Prof. Timko,J.

[29] Martinec, F.: Rezonančné meniče pre elektroenergetické a elektrické systémy lietadiel, Košice EF TU, 1992, 146 p.
(Resonant converters in aircraft electric systems)

[30] Milly,D.: Menič frekvencie s impulzovo riadeným usmerňovačom
(Frequency changer with PWM controlled rectifier)
(Ph.D. thesis-in Slovak), Košice, EF TU 1992, 98 p.
Thesis advisor: Assoc.Prof. Oetter,J.

[31] Nagy,M.: Riadenie jednosmerného motora pomocou pozorovateľa
      (State control of a DC motor with observer)
      (Ph.D. thesis- in Slovak), Košice, EF TU 1992, 150 p.
      Thesis advisor: Prof. Zboray,L.

6.4 Textbooks

[32] Kostelný, M., Kaňuch,J., Krištín,Š.: Elektrické stroje,
      Laboratórne meranie I.   (Electrical Machines, Laboratory
      measurement I.)
      1.ed. Košice, ES TU 1992, 110 p.(in Slovak)

[33] Timko,J., Dudrík,J.: Elektrické pohony a výkonová elektronika
      (Electrical Drives and Power Electronics)
      1.ed. Košice, ES TU 1992, 286p. (in Slovak)

[34] Timko,J., Fedák,V.: Elektrické pohony (Electrical Drives)
      2.ed. Košice, ES TU 1992, 335p. (in Slovak)

6.5 Other publications

[35] Dobošová,E.: Riadenie asynchrónneho motora s kotvou nakrátko
      (Control of an asynchronous motor),(Report to Ph.D. thesis-in
      Slovak), Košice, EF TU 1992,

[36] Girman a kol.: GAUS-Generátor automatizovaných systémov
      Zborník semináru "Transputer CS'92", Bratislava 1992,
      (GAUS-Generator of automatized systems)

[37] Kiovský,L.: Inteligentný stykový modul medzi TRANSPUTER-LINK
      a zbernicou SMP. Zborník semináru " Transputer CS'92",
      Bratislava 1992
      (The intelligent interface between TRANSPUTER -LINK and
      SMP-bus)

[38] Košč,P.: Robust speed-loop fuzzy logic controller for a DC

      motor
      (Report to Ph.D. thesis), Politecnico di Torino 1992,

[39] Kováč,D., Kováčová,I.: Zapojenie galvanického oddeľovacieho
      člena s optrónom. PV 824-92 (Connection galvanic detaching
      coupling with optron (Application of patent-1992)

[40] Maxim,V.: Výkonové polovodičové meniče pre napájanie spínaného
      reluktančného motora.
      (Power semiconductor converters for feeding of the switched
      reluctance motor) (Report to Ph.D. thesis - in Slovak) Košice,
      EF TU 1992

7. Current Postgraduates

Ph.D. Students in 1992

1. Bober Peter: MSc. 1989 TU Košice
   Ph.D., dissertation title:
   Digital control of AC drive
   Thesis Advisor: Fedor Pavol

2. Cverčko Ján: MSc. 1989 TU Košice
   Ph.D.,dissertation title:
   Adaptive control of strip's elongation in the finishing cold-
   strip mills
   Thesis Advisor: Ján Fetyko

3. Daubner Karol: MSc. 1990 TU Košice
   Ph.D., dissertation title:
   Drive control with elastic connection
   Thesis Advisor: Jaroslav Tomko

4. Dobošová Eva: MSc. 1987 TU Košice
   Ph.D., dissertation title:
   Phase control of small-power AC machines

Thesis Advisor: Jaroslav Vladář

6. Ferková Želmíra: MSc. 1987 TU Košice
   Ph.D., dissertation title:
   Contribution to the theory of the switched reluctance motor
   Thesis Advisor: Fedor Simkovic

8. Kaňuch Ján: MSc. 1986, TU Košice
   Ph.D., dissertation title:
   The dics step motor with axial air gap
   Thesis Advisor: Michal Kostelný

9. Kerestúri Marián: MSc. 1990 TU Košice
   Ph.D., dissertation title:
   Power switches without backward influence
   Thesis Advisor: Jozef Fedor

10. Košč Peter: MSc.1988 TU Košice
    Ph.D., dissertation title:
    Fuzzy control of the AC-drive
    Thesis Advisor: Viliam Fedák

11. Maxim Jaroslav: MSc. 1991 TU Košice
    Ph.D., dissertation title:
    Application of fuzzy control and neural networks in electrical
    drives
    Thesis Advisor: Viliam Fedák

12. Maxim Vladislav: MSc. 1988 TU Košice
    Ph.D., dissertation title:
    Steady - state and transient analysis of converter for switched
    reluctance motor
    Thesis Advisor: Juraj Oetter

13. Németh Juraj: MSc. 1990 TU Košice
    Ph.D., dissertation title:
    State control of a VSI-fed asynchronous motor
    Thesis Advisor: Ladislav Zboray

14. Stanislav Pčola: MSc. 1990 TU Košice

Ph.D., dissertation title:
State control of a synchronous motor
Thesis Advisor: Ladislav Zboray

15. Perduková Daniela: MSc. 1989 TU Košice
    Ph.D., dissertation title:
    Technological control of multimotor drive
    Thesis Advisor: Pavol Fedor

16. Struckel Pavol: MSc. 1990 TU Košice
    Ph.D., dissertation title:
    The electromagnetic noise source components of magnetic field in
    air gap of asynchronous induction motors sourced by no-harmonic
    voltage
    Thesis Advisor: Ladislav Hruškovič

17. Tvrdoň Miroslav: MSc. 1991 TU Košice
    Ph.D., dissertation title:
    The switched reluctance motor with axial air gap $2p_1/2p_2=6/4$
    Thesis Advisor: Michal Kostelný

18. Uhrín Rastislav: MSc. 1990 TU Košice
    Ph.D., dissertation title:
    Resonant converters
    Thesis Advisor: Imrich Pokorný

19. Kolcun Vladimír: MSc. 1992 TU Košice
    Ph.D., dissertation title:
    The switched reluctance motor with axial air gap-the
    construction and measurement
    Thesis Advisor: Michal Kostelný

8. Other Activities

8.1 Seminars

The Department of Electrical Drives organizes a series of scientific seminars for the department workers. On the seminars there are presented the results achieved in research activity of the department and the results of works of Ph.D. students.
The seminars are organized according to needs and their aim is to inform the workers about the state of scientific work in the department as well as the new knowledge in the specialization.

8.2 Conferences and meetings

Department of electrical Drives in an organizer of International Conference on Electrical Drives and Power Electronics which is held every second year in Košice.
The last conference was held on Sept. 14-16, 1992

1. Conference BME Budapest Hungary, August 1992 J.Fetyko

2. Conference "Motion Control for Intelligent Automation", University of Perugia, Italy, October 1992, Fedák,V., Fedor,P., Bober,P., Girman,M.

3. 3ed World Conference on Engineering Education University of Portsmouth United Kingdom, September 1992, Fedák,V., Fedor,J.,

4. Conference "Transputer Anwender Treffens '92", Aachen, Germany, September 1992, Girman,M., Bober,P., Fedor,P., Harčarufka,H.

5. Xth Symposium on Physics of Switching Arc. Oct. 1992 Brno, Fedor,J., Fedor,B.

6. Conference "Women in Engineering", University of Miskolc, Hungary, April 1992, Halušková,M., Perduková,D.

7. Seminar "Fachhochschule", Regensburg, Germany, November 1992, Kostelný, M.

8. Seminar Transputer CS'92, Bratislava, Czechoslovakia , September

1992, Kiovský,L.,
9. Conference ASKTP'92, Košice, Czechoslovakia. September 1992, Girman, M.

8.3 International Cooperation

The Department of Electrical Drives is involved in the TEMPUS project. JEP coordinator is the Napier University from the United Kingdom and the participating institutions are Technical University of Miskolc, Technical University of Košice, Politechnica de Valencia and Politecnico di Torino. The project is aimed at the following areas: development of the overall course structure, development of curricula and syllabuses, development of experimental and hands-on work programmes, organisation and planning of student training placemets, lecturing on the course microcomputer controlled drive systems in industrial automation.

8.4 Study tours

- Fetyko,J., Fedák,V., Kovalčin, S.: Technical University of Miskolc, April 1992
- Dudrík,J, Fedák,V., Fedor,J., Fetyko,J., Kiovský,L., Kovalčin,S., Struckel,P., Bober,P., Kerestúri,M., Maxim,J., Uhrín,R.: Napier University of Edinburgh, May-June 1992

- Fedor,J.: Napier University of Edinburgh, July 1992

- Uhrín,R.: Politecnico di Torino, November 1992

- Fetyko,J., Kovalčin,S., Fedák V.: Politecnico di Torino-Politechnica de Valencia-Napier University, Edinburgh, Februar 1992

- Fedák,V., Fedor,J.: ENSEM Nancy, France, Marec 1992

8.5 Visitors

January 1, 1992- December 31, 1992

Dr. Roland Hill
University of Bath
United Kingdom

Prof. Branislav Firago
Byelorussia State Polytechnical Academy
Republic Byelorussia

Prof. Oleg Bulatov
Moscow Power Engineering Institut
Russia

Prof. Lars Norum
University of Trondheim
Norway

Prof. Vladimir Pilinsky
Kiev Polytechnical Institute
Ukraine

Prof. Bernard Davat
Ecole Nationale Supérieure
d'Electricité et de Mécanique
France

Prof. Eugeniusz Koziej
Warsaw University of Technology
Poland

Doc. Richard Zygmunt
AGH Krakow
Poland

Prof. Laszlo Szentirmai
Technical University of Miskolc
Hungary

Prof. Sinclair Gair
Napier University of Edinburgh
United Kingdom

Mrs. Gesa Walker
Polyed Edinburgh
United Kingdom

Prof. Manuel Pineda
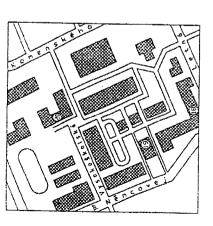Politechnica de Valencia
Spain

Prof. Francesco Profumo
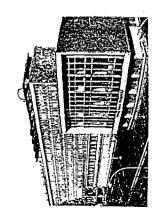Politecnico di Torino
Italy

Prof. Tivadár Szárka
Technical University of Miskolc
Hungary

8.6 Joint Projects with Industrial Sector

1. Tomko,J. at al: Design of the control algorithm for coiler

2. Fedor,P., Girman,M., Bober,P., Pčola,S.: Optimal application of frequency converters in power industry

3. Fedor,P., Bober,P.: Rosemount system 3. Operator's guide for operator's training on RS3-system

4. Fedor,J., Fedor,B., Kerestúri,M., Tvrdoň,M., Kaňuch,J.: Design of indoor type disconnector with electrical motor drive - 25kV, 1600 A

Editor: Dudrík,J.

KOŠICE

1 Cathedral
2 Theater
3 Railway Station
4 Bus Station
5 Osloboditeľov Sq.
6 Maratón Sq.
7 Amphiteater
8 Rest. Družba
9 Rest. Šport
10 Rest. u Leonarda
11 Rest. Asia
12 Rest. Tip-Top
13 Rest. Kriváň
14 Hotel Hutník
15 Hotel Slovan
16 Hotel Centrum
17 Hotel Coral
18 Tech. University
19 Conf. Centre
20 Hostel
21 Post Office

Technical University of Košice