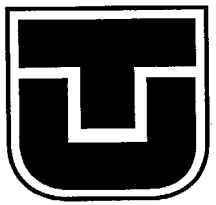
Technical University of Košice, Slovakia
Faculty of Electrical Engineering and Informatics



Annual Report

1996

Department of Electrical Drives

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Printing: Department of Electrical Drives, Technical University of Košice

Contents

Foreword

The report continues in the series of the Annual reports issued by the Department of Electrical Drives (Katedra elektrických pohonov) in order to present departmental activities during the year 1996: the position and structure of the department, information about under- and postgraduate courses, overview of students' works, research activities and projects with industry, a list of publications, information about the staff members and about scientific and other events organised by the Department in the year 1996.

The year 1996 was rich on events of various kind. Several events marked the departmental life more than those in previous years:

- several staff members left the Department: Ing. Eva Dobošová and Ing. Róbert Šándor,
- two staff members: Ing. Stanislav Kovalčin, CSc. and Ing. Juraj Haluška, CSc. left the department for one-year unpaid leave,
- Mr Anton Nagy and Doc. Ing. Imrich Pokorný, CSc. retired,
- the first postgraduate student, Ing. Rastislav Uhrín, finished a new form of the postgraduate study (received the title Dr. Ing. in opposite to the previous form, where the graduate received the title CSc. - candidate scientorum),
- Ing. Pavol Záskalický, CSc. delivered and defended his habilitation thesis and received the title Doc. (equivalent to Associate Professor),
- the Department organised in October 1-3 the 13th international scientific conference on Electrical Drives and Power Electronics, EDPE'96,
- as a part of the EDPE'96 conference, the Industry Day was organised in a day prior the conference on a national basis: meeting of producers, sellers amd specialists in fields of electrical drives an power electronics accompanied by a small exhibition,
- a new project in the program of international co-operation CEEPUS was approved,
- a successful series of short specialised courses for specialists from industry has started in order to disseminate the latest knowledge. The courses were supported by the TEMPUS JEN project.
- also students contributed to spread the good name of the Department by participation in the international students' conference and winning the strongest session - Electrical Drives.

The description in this brochure is necessarily brief and further information can be obtained by contacting the department or the person concerned.

Doc. Ing. Jozef Fedor, CSc.
Head of the Department

1. Introduction

The Faculty of Electrical Engineering and Informatics (FEI) of the Technical University of Košice was founded in 1969. Since its establishment 6031 students graduated at the faculty (in 1996 there were 231 brand new graduates). Currently there are about **1910** undergraduate and 126 postgraduate students. The faculty staff consists of 203 members, among them 13 full professors, 51 associate professors, 105 assistant professors, 11 assistants and 23 research workers.

The FEI offers a full university education in five-years courses (Ing. degree). After finishing two years of study filled by basic general subjects and main subjects from electrical engineering, in subsequent years the students can select their own specialisation. At the end of the engineering courses, students defend graduate theses (diploma works). The FEI offers also other types of education: Bc. degree (bachelor) in three-years courses and Dr. Ing. postgraduate education in four-years courses.

The Department of Electrical Drives - Katedra elektrických pohonov - KEP is one of the 10 departments of the FEI and it is the largest department within the Faculty. The Department is responsible for education in the field of Electrical Engineering. The main aim is to prepare undergraduate students for their career both in industry and research. The Department offers the Master of Science Degree (Ing.) and Doctoral (Dr.) degrees. Since the faculty establishment in 1969, totally 1394 students graduated at the Department. Due to recession in industry, the number of graduates has temporarily decreased in last years (1990 - 84, 1991 - 79, 1992 - 78, 1993 - 96, 1994 - 62, 1995 - 59, 1996 - 42). The students are studying at the Department since the third year of their study: in the current 1996/97 academic year there are totally 98 students studying at the department (31 students in the third year, 30 in the fourth and 37 students in the fifth year).

The Department offers also postgraduate education. Since its establishment, 33 postgraduate students have defended successfully their dissertations and were awarded by the CSc. degree (equivalent of a Ph.D. degree). There are 12 supervisors within the Department specialised in different fields of electrical engineering. The current number of full- and part-time Ph.D. students is 14 (in 1995 there were 8).

The Department is strong involved in teaching of students from other faculties of the technical University by presenting electrical engineering courses. The number of student reaches 264 from Faculty of Mechanical Eng. (SjF), 280 Faculty of Mining Engineering (FBERG) and 100 Faculty of Metallurgy (HF).

2. Structure of the Department

The total number of staff members is 40; among them 31 full academic staff, 4 researchers and 5 supporting and technical staff. Internally the department is divided into 5 divisions:

1. Division of Electrical Drives
2. Division of Power Electronics
3. Division of Electrical Machines and Apparatus
4. Division of Automation of Electrical Equipment
5. Division of General and Applied Electrical Engineering (responsible for education of electrical engineering courses for other faculties within the TU).

An overview over division of the department is given in the table:

Head of Department:	*Jozef Fedor*
Deputy Head of Department:	*Viliam Fedák*

Divisions:

Electrical Drives	**Power Electronics**	**Electrical Machines and Apparatus**
Ján Fetyko	*Jozef Ondera*	*Michal Kostelný*
Prof. Jaroslav Timko Prof. Ladislav Zboray Viliam Fedák Jaroslav Tomko František Durovský Marcela Halušková Le Quang Duc - Ph.D. student Martin Frena - Ph.D. student	Jaroslav Dudrík Irena Kováčová Imrich Pokorný Peter Višnyi - research worker	Jozef Fedor Bartolomej Fedor Želmíra Ferková Ján Kaňuch

Automation of Electrical Equipment	**General and Applied Electrical Engineering**	**Supported and Technical Staff**
Pavol Fedor	*Pavel Záskalický*	Veronika Majerníková Katarína Gočová Vasil Graban Františka Dorčáková
Michal Girman Peter Bober Stanislav Fedor Daniela Perduková Rastislav Harčarufka- researcher Peter Košč - research worker Gabriela Brečková Ján Skonc - Ph.D. student	Vladislav Maxim Dionýz Milly Juraj Németh - dept. secret. Vladimír Kolcun Miroslav Tvrdoň Jaroslava Žilková Stanislav Kovalčin	

3. Education

3.1 Master's Degree (Ing.) Undergraduate Course

The course lasts five years of study. In the first two years basic knowledge of engineering is given to students at other departments of the faculty. Since the third year of study when students are taught under the supervision of the Department, the students are specialised according to their interest by choosing the optional subjects. In such way they approach more-or-less to one from the following lines of study:

1. Electrical Drives
2. Power Electronics
3. Electrical Machines and Apparatus
4. Automation of Electrical Equipment

1. Electrical Drives

Students are prepared for design and operation of electrical drives used to drive various working machines and mechanisms. During study period the students are also acquainted with knowledge of power and control electronics and computer techniques.

2. Power Electronics

Power Electronics is dealing with control and transformation of electrical energy from an available form into a required form. Besides the fundamental subjects the students are prepared for analysis, modelling, design, construction, and control of power semiconductor converters. They receive deeper knowledge from electronics, esp. digital electronics.

3. Electrical Machines and Apparatus

Within the framework of this branch of study the students are taught theory, design, technology and construction of electrical machines and apparatus using classical and computer - aided design methods.

4. Automation of Electrical Equipment

The stress is focused on subjects concerning electronics and microelectronics, advanced control theory, computer technique, design of control and regulation for complex systems, both from the HW and SW points of view. The goal of the study is to prepare students to design and maintain the control systems of technological processes.

Overview on the Master's Degree (Ing.) Undergraduate Course Programme

The Third Year

Duration: 14 + 14 weeks

Option Subject	5th Sem. Lect./Lab.	6th Sem. Lect./Lab.	N° of credits	Lecturer
Compulsory Subjects				
Social Sciences	0/2 ca		2	
Theory of Control	2/2 ex		5	Bučko
Applied Electronics	3/3 ex		7	Oetter
Electrical Machines I.	3/3 ex		7	Kostelný
Optional Subjects (student choose min. 2 subjects)				
Superconductivity and Ferromagnetism	3/1 ex		4	Dudáš
Control Systems Software	2/2 ex		4	Girman
Mechanics	2/2 ex		4	Jurica
Electrical Heating and Light Techniques	2/2 ex		4	Novák
Model. and Measurement of Control Circuits	1/3 ex		4	Kováčová
Applied Mathematics	2/2 ex		4	Pirč
Compulsory Subjects				
Power Electronics I.		3/3 ex	7	Dudrík
Automation of Electrical Equipment I.		2/3 ex	6	Girman
Electrical Apparatus		3/2 ex	6	Fedor J.
Optional Subjects (student choose min. 2 subjects)				
Parts of Controlling Systems		3/3 ex	7	Haluška
Electrical Machines II.		3/3 ex	7	Kostelný
Components of Digital Control Systems		2/2 ex	5	Haluška
Electromechanical Systems		2/2 ex	5	Fedák, Fetyko
Optional Subject from the Faculty List				
Required number of credits			60	

The Fourth Year

Duration: 14 + 14 weeks

Option Subject	5th Sem. Lect./Lab.	6th Sem. Lect./Lab.	N° of credits	Lecturer
Compulsory Subjects				
Electrical Drives	3/3 ex		7	Timko
Power Engineering I.	3/3 ex		7	Chladný
Optional Subjects (student choose min. 3 subjects)				
State Control of Electrical Drives	2/3 ex		6	Zboray
Control Systems Construction	2/3 ex		6	Haluška
Industrial Systems Identification	2/3 ex		6	Fedák
Control Circuits for Power Electronics	2/3 ex		6	Oetter
Computer Aided Design	2/3 ex		6	Kovalčin
Electrical Machines Construction	3/2 ex		6	Ferková
Modelling of Converters	1/3 ex		5	Kováčová
Parts and Systems of Mechanisms	2/2 ex		4	
Optional Subject from the Faculty List				
Compulsory Subjects				
Economy I.		0/2 ca	2	
Controlled Drives		3/3 ex	7	Zboray
Automation of Electrical Equipment II.		3/3 ex	7	Fedor P.
Optional Subjects (student choose min. 3 subjects)				
Electrical Apparatus Construction		2/3 ex	6	Fedor J.
Electrical Drives Design		2/3 ex	6	Pokorný
Complex Drive Systems		2/3 ex	6	Fedák
Power Semiconductor Converters II.		3/3 ex	6	Ondera
Power Engineering II.		3/2 ex	6	Kolcun
Computer Aided Design		0/4 ca	2	Fedor S.
Controlling Electronic Circuits		0/4 ex	2	Fedor S.
Power Electronics Laboratory Practice		0/2 ca	2	
Required number of credits			60	

The Fifth Year

Duration: 14 + 10 weeks

Option Subject	5th Sem. Lect./Lab.	6th Sem. Lect./Lab.	N° of credits	Lecturer
Compulsory Subjects				
Economy II.	0/2 ca		2	
Master Thesis Seminar	0/5 ca		5	
Optional Subjects (student choose min. 4 subjects)				
Special El. Machines and Apparatus	3/2 ex		6	Kostelný, Fedor J.
Semiconductor Converters Applications	2/3 ex		6	Ondera
Converters Design and Construction	2/3 ex		6	Pokorný
Control of Robots and Manipulators	2/3 ex		6	Fetyko
Control Systems of Technological Plants	2/3 ex		6	Girman
Industrial Drives	2/3 ex		6	Tomko
High-Voltage Technique	2/3 ex		5	Marton
Electrical Equipment Construction	2/2 ex		5	Fedor S.
Microcomputer Control of Converters	2/2 ex		5	Višnyi
Optional Subject from the Faculty List				
Master Thesis (Diploma Work)			x	
Required number of credits			30	

The Department of Electrical Drives ensures teaching of specialised subjects in other lines of study within the FEI and is also responsible for teaching of subjects dealing with electrical engineering fundamentals at other faculties of the TU: Electrical Engineering Fundamentals (for different faculties), Apparatus and Equipment, Electrical Apparatus for Working Machines, Special Electrical Drives, Spreadsheets and Databases, Electronic Elements, Drives and Power Electronics, Electrical Equipment for Machines in Food Industry, Editors, Instrument Engineering, Electrical Drives and Electrical Accessories of Machines in Food Industry, Electrical Drives and Electrical Accessories of Agricultural Machines, Special Electronics, Electrical Drives, Electrical Apparatus, Electrical Machines.

3.2 Doctor's Degree (Dr.) Postgraduate Course

Students with a Master's Degree (Ing.) can apply for a postgraduate course lasting four years. The postgraduate program is divided into two parts. In the first two years, deep knowledge of the branch followed is given. The work in the third and fourth year of study is concentrated on research. The course is finished by a public defence of the dissertation.

Overview on the Doctor's Degree (Dr.) Postgraduate Course Programme

First Year

Specialisation: Electrical Drives, Power Electronics, Electrical Machines and Apparatus

Subject	Hours per year	Lecturer
Mathematics	90 ex	
* Mathematics	60 ex	Pirč, Petruška
* Physics of Magnetic Phenomena	30 ex	Zagyi, Ziman
Theoretical Basis of the Specialisation	60 ex	supervisor
Foreign Language	30 ex	
Total:	210 hours	
Number of examinations	3 (4*)	

* for Electrical Machines and Apparatus specialisation only

Second Year

Subject	Hours per year	Lecturer
Subject of Specialisation	30 ex	supervisor
* Electrical Machines and Apparatus	30 ex	Kostelný, Fedor J.
* Power Electronics	30 ex	Pokorný, Dudrík
* Computers Application in El. Engineering	30 ex	Girman, Višnyi, Haluška
* Controlled Drives	30 ex	Zboray, Tomko
* Complex Drive Systems Control	30 ex	Fedák
* Servomechanisms in Robotics	30 ex	Fetyko
* Electronics	30 ex	Oetter, Haluška
* Control Theory	30 ex	Krokavec D.
Foreign Language II. (individual preparation)		
Total:	120 hours	
Number of examinations	5	

* Students choose three from optional subjects based on the supervisor recommendation and according to the theme of thesis.

4. Current Research Projects

The research carried out at the Department of Electrical Drives covers a broad field of interest. The research is concentrated on CAD of electrical machines and apparatus, controlled electrical drives, power electronics converters with improved dynamic properties, applications of the latest knowledge of control theory and computers to control of complex drive systems, multi-motor drives of manufacturing lines, industrial plants and robots. Its control is based on microcomputer implementation of control algorithms. Existing control theories are extended and modified in a real-time environment. Rules are developed to choose the control algorithms and to tune the parameters of drives.

Scientific research is carried out in collaboration with national authorities and industry. Projects with industry are described at the end of this brochure. The following research projects were carried out at the Department in 1996 year:

1. Control of Drives for Vibration Equipment
2. Special Electrical Drives of Low Power Rating
3. Software and Hardware Development of Distributed Control Systems for Multi-Motor Drives and Complex Drive Systems
4. Advanced Control Methods in Field of Industrial Automation
5. Power Semiconductor Converters with Low Power Losses
6. Control of Multi-Motor Electromechanical Systems

1. Control of Drives for Vibration Machines

Supported by grant N° 2323/95 of the Grant Agency for Science.
Duration: 1995 - 1997
Co-ordinator: Jaroslav Tomko
Members: František Ďurovský, Jozef Fedor, Želmíra Ferková, Vladislav Maxim, Dionýz Milly, Juraj Oetter, Róbert Šándor (33 %), Ladislav Zboray (66 %), Ph.D. students: Le Quang Duc, Tibor Takáč

Goals of the project:

To find a suitable drive for various applications of vibration machines and to design suitable control circuits for them.

Research activity of the group is concentrated on:

- design of switched reluctance motor of rating power 3 kW and nominal revolutions 3000 rev./min.
- choice of a commercially produced converter with possibility of its adjusting for supplying of the SRM,
- design and adjusting of the position sensor of the rotor of SRM,
- design and production of trajectory sensor of vibration movement,
- mathematical model of the vibration machine,
- design and verification of the control structure in order to check possibilities to change a trajectory of a vibration movement.

Results achieved in 1996:

- derivation of a non-linear mathematical model of a vibration mill, its simulation and verification by measuring on the laboratory equipment,
- calculation of magnetic flux of SRM using the finite-elements method and taking into consideration the motor construction,
- investigation of the SRM from the view of point of possibility to change in the trajectory of movement of the vibration machine,
- modifications in the programme PSPice and its utilisation for simulation of dynamic phenomena in electro-magnetic circuits of the system converter - SRM,
- analysis of frequency converters from the point of view of its utilisation in the system asynchronous motor drive - vibration machine,
- utilisation of the PSPice programme to design power elements of the SRM drive.

Publications: [S5] , [S6], [S7], [C3], [C8], [C11], [C12], [C15], [C17], [C19], [K2], [K3], [K4], [K8], [K9], K[14], [K17], [H1], [H2]

2. Special Electrical Drives of Low Power Ratings

Research project N° 41152 based on institutional granting.
Co-ordinator: Michal Kostelný
Members: Bartolomej Fedor, Ján Kaňuch, Vladimír Kolcun, Pavel Záskalický

Goals of the project:
To design and investigate properties switched reluctance and step motors.

Research activity of the group is concentrated on:

- development and realisation of the switched reluctance motor (SRM) with axial magnetic field,
- development of a step motor with axial magnetic field,
- design of new structures of switched reluctance and step motors,
- optimisation of switching processes; calculation of currents and torque.

Results achieved in 1996:

- debugging a program to calculate the motor with axial magnetic field for various configurations,
- electromagnetic design of SRM with axial magnetic field and optimisation of disc dimensions,

- theoretical design of linear switched reluctance motor with simple and double rotor,
- general theory on unsymmetrical structures SRM and step motors,
- optimisation of switching at low speed: analytical calculation of currents and torque by linearisation of the magnetic curve.

Publications: [C16], [K15], [H3]

3. Software and Hardware Development of Distributed Control Systems for Multi-Motor Drives and Complex Drives Systems

Research project N° 41151 based on institutional granting
Co-ordinator: Michal Girman
Members: Peter Bober, Pavol Fedor, Stanislav Fedor, Juraj Haluška, Rastislav Harčarufka, Peter Košč, Daniela Perduková
Ph.D. students: Do Quoc Vu, Ján Skonc

The project deals with two basic topics:

- Methodology of control circuit design for one- and multi-motor drives, synthesis of regulators for asynchronous motor drives using Lyapunow theory and applying fuzzy regulators to control the drives.
- Development of environment for control systems based on transputer network. Design and debugging of software tools for modelling, monitoring and control of complex drive systems.

Results achieved in 1996:

- design and debugging of the transputer module and reserved memory,
- software for observing the intensity of communication in multi-processor system,
- methodology of design of controller type for DC and AC drives.

Publications: [S2], [J1], [C4], [K5], [K7], [K13]

4. Advanced Control Methods in Field of Industrial Automation

Supported by grant N° 1/3204/96 of the Grant Agency for Science (FEI code 9438).
Duration: 1996 - 1997
Co-ordinator: Jaroslav Timko
Members: Dušan Balara, Pavol Fedor (50 %), Marcela Halušková, Dobroslav Kováč (33 %), Irena Kováčová (66 %), Danka Perduková (50%), Jaroslava Žilková

Goals of the project:
To adapt the modern control methods (fuzzy controllers, neural networks, adaptive controllers and controllers with variable structures) to chosen industrial drives.

Research activity of the group is concentrated on:

- applications of neural networks in control and identification of electrical drives,
- control of AC drives,
- modernisation of converters considering the electromagnetic compatibility.

Results achieved in 1996:

- control of technological lines with incomplete access to state variables,
- dynamic control of drives with synchronous motor,
- measurement and modelling of power semiconductor devices and inverters,
- influence of higher harmonics to accuracy of measurements by measuring transformers,
- identification of non-linear systems using the artificial neural networks.

Publications: [M1], [S2], [S8], [D1], [C1],[C4], [C5], [C9], [C10], [C14], [C18], [C20], [K5], [K7], [K10],[K11], [K13], [K16], [O1]

5. Power Semiconductor Converters with Low Power Losses

Supported by grant N° 1/3510/96 of the Grant Agency for Science (FEI code 9440).
Duration: 1996 - 1998
Co-ordinator: Jaroslav Dudrík
Members: Stanislav Kovalčin, Jozef Ondera, Imrich Pokorný, Peter Višnyi

Goals of the project:
To develop, investigate and verify connection of converters for various applications while taking into considerations decrease of switching losses in power semiconductor devices working at high frequencies.

Research activity of the group is concentrated on:

- design and development of a three-phase frequency converter with the resonant link,
- debugging of models of indirect DC converters,
- design and realisation of laboratory prototype of DC converter with possibility to modify various structures and different control methods.

Results achieved in 1996:

- design of microprocessor control of indirect DC converters,
- design and verification of basic properties of an indirect DC converter,
- starting works on design and construction of indirect converter with a resonant inverter,

Publications: [S1], [S4], [S9], [C2], [C13],[K1], [K12]

6. Control of Multi-Motor Electromechanical Systems

Supported by grant N° 1/3203/96 of the Grant Agency for Science (FEI code 9439).
Duration: 1996 - 1998
Co-ordinator: Ján Fetyko
Members: Viliam Fedák, Ján Čverčko (VSŽ Oceľ, Košice), Ladislav Zboray (30 %)

Goals of the project:

To adapt the modern control theory (non-adaptive, adaptive and optimal state control methods) for multi-motor electromechanical systems (robots, manipulators and continuous technological lines).

Research activity of the group is concentrated on:

- setting-up of models for chosen electromechanical systems (rolling mill and robot with 6 degrees of freedom),
- interpretation of state control for multi-motor electromechanical systems,
- verification of designed control structures,
- comprehensive preparing of the topic.

Results achieved in 1996:

- setting-up a mathematic model and debugging of the simulation model of the chosen subsystems of the technological lines with continuous web: model of strip line, feed rollers, stretch and dancing rolls.
- synthesis of state control of drives with feedforward correction.

Publications: [S7], [C6], [C7], [C17], [C19], [K2], [K3], [K9]

5. Publications in 1996

1. Monographies

[M1] Kováčová, I.-Kováč, D.: Power Transistors MOSFET and IGBT. ELFA Košice, 1996, 120 pp. (in Slovak)

Teaching books and Teaching Materials

[S1] Dudrík, J.: Modern Power Semiconductor Devices. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 54 p. (in Slovak)

[S2] Fedor, P. - Perduková, D.: Visualisation of Technological Processes. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 81 p. (in Slovak)

[S3] Kováčová, I. - Kováč, D.: Modelling and Measurement of Electrical Circuits. Manual for Training. ELFA Košice, 1996, pp. 7-9 (in Slovak)

[S4] Kovalčin, S.: Automatised Design using Computers. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 146 p. (in Slovak)

[S5] Oetter, J.: New Circuits of the Control Electronics. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 89 p. (in Slovak)

[S6] Tomko, J.: Industry Applications of Electrical Drives. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 81 p. (in Slovak)

[S7] Zboray, L. - Ďurovský, F.: State Control of Electrical Drives. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 119 p. (in Slovak)

[S8] Vaščák, J. - Žilková, J.: Fuzzy Logic and Neural Networks Applications in Electrical Drives. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 64 p. (in Slovak)

[S9] Višnyi, P.: Digital Signal Processor DSP-56001 and its Applications. Teaching material to Short Specialised Course. KEP FEI TU Košice, 1996, 37 p. (in Slovak)

2. Papers in the domnestic specialised journals

[J1] Perduková, D. - Fedor, P.: Control of a Continuous Line with Incomplete Access to State Variables. Journal of Electrical Engineering 48 (1996), N° 1-2, p. 3-9

3. Contributions at the international conferences

[C1] Balara, D. - Žilková, J.: Parametric Identification of Nonlinear DC Motor Model Using Neural Networks. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná, 1-3 Oct.1996, p. 548-553

[C2] Dudrík, J.: Indirect DC-To-DC Converter for Arc Welding. EDPE '96 Int. Conf., Stará Lesná , 1-3 Oct.1996, p. 333-336

[C3] Ďurovský, F.: Application of Computer Algebra System to Nonlinear Controller and Observer Design. In: Proceedings of the XIV. Int. Symposium on Electromagnetic Phenomena in Nonlinear Circuits, Poznaň, May 1996, p. 233-236

[C4] Fedor, P. - Timko, J.: Dynamische Regelung des Synchronmotorantriebes. In: Int. Conf. Proceedings „Power Electronic Actuators and Intelligent Motion Control", Magdeburg, Apr. 1996, s.173-178

[C5] Fedor, P. - Perduková, D. - Bober, P.: The Multi-Motor Drive Model for Teaching of Technological Line Control. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná , 1-3 Oct.1996, p. 359-361

[C6] Fetyko, J.: A Synthesis of State-Feedback and Feedforward Tracing Control of a DC Servo Drive. In: Int. Conf. Proceedings „microCAD '96", University of Miskolc, 29 Feb. 1996

[C7] Fetyko, J.: State-Feedback and Feedforward Tracking Control of DC Servo Drives. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná , 1-3 Oct.1996, p. 641-645

[C8] Hrabovcová, V. - Rafajdus, P. - Ferková, Ž.: Test and Simulation Results of Switched Reluctance Motor (SRM) Characteristics. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná, 1-3 Oct.1996, p. 516-520

[C9] Kováčová, I. - Kováč, D.: Measuring of Non-Harmonic Signals by High Voltage Measurement Transformer. In: Int. Conf. Proceedings „microCAD '96", Miskolc, 29 Feb. 1996, s.21-23

[C10] Kováčová, I. - Kováč, D.: Measuring and Modelling of Power IGBTs. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná, 1-3 Oct.1996, p. 394-397

[C11] Maxim, V. - Milly, D.: Simulation of a Switched Reluctance Motor (SRM) Using a Nonlinear Empirical Model. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná, 1-3 Oct.1996, p. 638-640

[C12] Tomko, J.-Milly,D.-Maxim,V.: An Analysis of Power Rectifier Breakdown Using PSppice. In: Int. Conf. Proceedings „microCAD '96", 29 Feb. 1996, p. 25-31

[C13] Višnyi, P.: Novel Method of A/D Conversion for Incremental Position Sensors. In: Proc. of the IEEE Int. Symposium on Industrial Electronics, Warsaw-Poland, 17-20 June 1996, p. 444-446

[C14] Timko, J. - Kováčová, I. - Kováč, D.: Measuring of Non-Harmonic Signals by High Voltage Measurement Transformer. In: Int. Conf. Proceedings „PEMC '96", Budapest, 2-4 Sept. 1996, p. 429-430

[C15] Tomko, J. - Milly, D. - Maxim, V.: An Analysis of Power Rectifier Breakdown Using PSPice. In: Int. Conf. Proceedings „microCAD '96", University of Miskolc, 29 Feb. 1996, p. 25-31

[C16] Záskalický, P.: Analytical Calculation of Currents and Torques of Switched Reluctance Motor. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná, 1-3 Oct.1996, p. 526-530

[C17] Zboray, L.: Nonlinear State Control with Increased Robustness. In: Int. Conf. Proceedings „EDPE '96", Stará Lesná, 1-3 Oct.1996, p. 199-202

[C18] Balara, D. - Žilková, J.: The Fast Parametric Identification of the 1st Order Inertia System Using Neural Networks. In: Proceedings of the 1-st Slovak Int. Neural Networks Symposium, ELFA Košice, Nov. 1996, p. 206-215

[C19] Zboray, L.: Nonlinear Drive Control with Compensated Parameter Variations. In: Proceedings of the XIV. Int. Symp. on Electromagnetic Phenomena in Nonlinear Circuits, Poznaň, May 1996, p. 227-231

[C20] Balara, D. - Žilková, J.: The Speed-Sensorless Parametric Identification of the Nonlinear DC Motor Model with Thyristor Converter Using Neural Networks. In: Proc. of the Int. Conf., Košice, 18-19 Nov. 1996, p. 50-54

Contributions at domnestic conferences

[K1] Dudrík, J. - Ondera, J.: Development Trends in Field of Converters of Electrical Energy. In: Proceedings of the conf. ELMAT '96, Košice, 8 May 1996, p. 57-59 (in Slovak)

[K2] Fedák, V. - Fedor, J.: Contribution of the Tempus Project to Education in Electrical Engineering. Tempus Workshop „Engineering and Related Sciences", Bratislava, 17-20 Apr. 1996, p. 86-87

[K3] Fedor, J. - Fedák, V.: Present State and Trends of Development of Electrical Engineering. In: Proc. of the Conf. ELMAT '96, Košice, 8 May 1996, p. 21-27 (in Slovak)

[K4] Fedor, J.: Profile, Aims and Mission of the Department of Electrical Drives FEI TU of Košice. In: Conf. Proc. of the Industry Day „EDPE '96", Stará Lesná, 30 Sept. 1996, p. 1-5 (in Slovak)

[K5] Fedor, P. - Perduková, D.: Car Control Model for Asphalt Transport. In: Proc. of the 2nd Conf. with Int. Participation „Process Control", Vol. 2, p. 78-22

[K6] Harčarufka, R. - Hračarufková, K. - Fedor, M.: Control Information System of the Concrete Mixing Plant. In: Proc. of the 2nd Conf. with Int. Participation „Process Control", Vol. 2, p. 112-116 (in Slovak)

[K7] Fedor, P. - Harčarufka, R.: Information Control System for Asphalt Compounds Wrapping. 12th Int. Conf. on Process Control and Simulation, ASRTP '96, Vol. 2, VSŽ Košice, 10-13 Sept. 1996, p. 37-41

[K8] Ferková, Ž.: Comparison of Switched Reluctance Motors $2p_1/2p_2=8/6$ a $2p_1/2p_2=6/4$, In: Proc. of the Int Coloquium of Departments of El. Machines, VŠDS Žilina, 16-18 Jan. 1996, s.49-54 (in Slovak)

[K9] Fetyko, J. - Tomko, J.: Applications of Modern Drive Systems. In: Proc. of the Conf. ELMAT '96, Košice, 8 May 1996, p. 53-56 (in Slovak)

[K10] Kováčová, I.: Function Simulation of Converters and Inverters in PSPice Program. In: Proc. of the Int. Symposium of Teachers from Depts. of Electrical Drives and Power Electronics SYMEP '96, Brno 1996, p. 75-80 (in Slovak)

[K11] Šimko, V. - Kováčová, I.: Utilisation of the Program TINA in Education. In: Proc. of the Scient. Conf. with Int. Participation „New Trends in Signal Processing" , Liptovský Mikuláš, 29-31 May 1996, p. 110-115 (in Slovak)

[K12] Kovalčin, S.: Possibilities of Control of Small Piesoelectrical Motors. In: Proc. of the Conf. SEKEL '96, Stará Lesná, 27-28 Sept. 1996, s. 79-81 (in Slovak)

[K13] Timko, J. - Kováč, D. - Fedor, P.: Parameters Determination for a Measurement High Voltage Transformer. In: Conf. Proc. of the Industry Day „EDPE '96", Stará Lesná, 30 Sept. 1996, p. 59-65 (in Slovak)

[K14] Tomko, J.: Drives for Cranes. In: Proc. of the Conf. SEKEL '96, Stará Lesná, 27-28 Sept. 1996, p. 33-45 (in Slovak)

[K15] Záskalický, P.: New Structures of Step Motors. In: Proc. of the Conf. SEKEL '96, Stará Lesná, 27-28 Sept. 1996, s.70-74 (in Slovak)

[K16] Žilková, J.: System Identification using Neural Nets. In: Proc. of the Conf. SEKEL '96, Stará Lesná, 27-28 Sept. 1996, p. 55-60 (in Slovak)

[K17] Maxim, V. - Milly, D.: Measurement of Nonlinear Inductance of the Phase Winding of Switched Reluctance Motor (SRM). In: Proc. of the Conf. SEKEL '96, Stará Lesná, 27-28 Sept. 1996, s. 75-78 (in Slovak)

4. Other Publications - Dissertations, Patents, Reports and Projects with Industry

Defended Dissertations

[D1] Záskalický, P.: Properties of Switched Reluctance Motors. Habilitation. KEP FEI TU Košice, 1996, 61 p. + 30 p. encl.

[D2] Uhrín, R.: Conversion System with Parallel Resonant DC Link. Dissertation, FEI TU, Košice, 1995, 129 p. Superrvisor: Pokorný I.

Submitted Dissertations, but Prior the Defension

[D3] Maxim, V.: Analysis of the Steady and Transient States in the Power Semiconductor Converter of SRM. Dissertation, FEI TU, Košice, 1996. Supervisor: Oetter J.

Projects with Industry

[H1] Tomko, J. - Milly, D. - Ďurovský, F. - Maxim, V.: Solution for Adaptation in the Gas Mixing and Increasing Station. VSŽ, a.s., DZ Teplá valcovňa, Košice. Project N° 8/0415/96, KEP FEI TU Košice, 1996, 56 p. (in Slovak)

[H2] Tomko, J. - Milly D.: Design for Solution of Reconstructions of Drives for Pumps and Fans with Asynchronous Motors Supplied by Voltage 6 kV. VSŽ, a.s. - DZ Teplá valcovňa, Košice. KEP FEI TU Košice, 1996, 25 p. (in Slovak)

[H3] Fedor, J. - Kostelný, M. - Hoszúréty, Z. a kol: Pump Driven by Synchronous Motor. Siemens Automotive, s.r.o. Michalovce. Project N° 2/0415/96, 33 p. (in Slovak)

Specialised Publications

[O1] Šimko, V. - Kováč, D. - Kováčová, I.: MS Word 6.0 for Windows in Questions and Answers. ELFA Košice, 1996, 100 p. (in Slovak)

[O2] Fedák, V. - Fedor, J.: Compilation and editation of proceedings of Int. Conf. on Electrical Drives and Power Electronics, EDPE '96, 2 Vol., 650 p., ISBN 80-967249-3-2

6. Students Works in 1996/97

6.1 Graduate Theses (Diploma Works)

- **Power Electronics**

1. Hučko, J.: Converter for Arc Welding
   Adviser: Dudrík
2. Kostyál, M.: Design of Power Converters Series for DC and AC Drives of Power till 6 kW
   Adviser: Kovalčin, S.
3. Knežo, B.: Design of Converter Supplying Halogen Lighting Fitting
   Adviser: Ondera, J.
4. Kyselica, M.: Design of Drive Reconstruction for Calender - Power Semiconductor Converter Design
   Adviser: Pokorný, I.
5. Lagin, T.: Stabilised Source of Harmonic Current
   Adviser: Kováč. D.
6. Matliak, J.: Universal Generator for Self-Commutated Converters
   Adviser: Oetter, J.
7. Takáč, T.: Switched Source of DC Voltage
   Adviser: Dudrík, J.

- **Electrical Drives**

1. Doložinsky, L.: Control of AC Drive using the Variable Structure Method
   Adviser: Timko, J.

2. Falis, P.: Modernisation of Drive for Paper Glazing Calender
Adviser: Tomko, J.
3. Frena, M.: State Control of a DC Electrical Drive
Adviser: Ďurovský, F.
4. Hricík, Ľ.: CAD of Controllers for Multimotor Drive using the INA Method
Adviser: Fedák, V.
5. Uhrín, J.: State Control of Asynchronous Motor
Adviser: Zboray, L.
6. Lacko, M.: Modelling of Subsystems of Multimotor Electromechanical Systems
Adviser: Fedák, V.
7. Lomnický, E.: Construction of Vibration Mill Drive
Adviser: Tomko, J.
8. Németi, Š.: CAD of a PID Controller with Dyadic Structure for a Multimotor Drive
Adviser: Fedák, V.
9. Pillár, P.: Speed Drive with Switched Reluctance Motor
Adviser: Tomko, J.
10. Stronček, Ľ.: Position Servosystem for Robot with a Dynamic Forward Precorrection
Adviser: Fetyko, J.
11. Varga, P.: Design of a Controlled Drive to Drive a Crane Truck
Adviser: Tomko, J.

- **Electrical Machines and Apparatus**

1. Al Chakoimi S.: Switched Reluctance Motor
Adviser: Ferková, Ž.
2. Horváth, N.: Separating Transformers with Decreased Transfer of Capacitance Currents
Adviser: Kostelný, M.
3. Ivanov, P.: Linear Switched Reluctance Motor
Adviser: Kostelný, M.
4. Knut, M.: Design of Thermal Release of a Starter Monoblock
Adviser: Fedor, J.
5. Madej, M.: Transformers for Switched Supplies with Power up to 10 kVA
Adviser: Kostelný, M.
6. Pepich, T.: CAD of DC Dynamo
Adviser: Kostelný, M.
7. Powieschill, R.: CAD of a DC Motor
Adviser: Kostelný, M.
8. Ruman, M.: Design of a Short-Circuit Release of a Starter Monoblock
Adviser: Fedor, J.

- **Automation of Electrical Equipment**

1. Antal D.: A Training Panel with the Logic Processor (ELC 2001)
Adviser: Haluška, J.
2. Balara, D.: Electrical Drive Parameters Identification Using Neural Networks
Adviser: Girman, M.

3. Fetyko, J.: Simulation and Programming of Educational Robot
Adviser: Fedák, V.
4. Gula, J.: Collection of Demonstration Programs for Logic Processor ELC 2001
Adviser: Haluška, J.
5. Huray, M. Control of a Truck for Transport of Materials into Reservoir
Adviser: Fedor, P.
6. Huňady, R.: Design of Transputer System Based on the Transputer T800
Adviser: Haluška, J.
7. Dzubák, J.: Control of Communication JRS with More Processors
Adviser: Girman, M.
8. Chovanec, R. Control of Electrical Drives Using Neural Networks
Adviser: Girman, M.
9. Chmelík, M.: Modelling of Technological Systems Using P-Nets
Adviser: Girman, M.
10. Čajka, J.: Control of Torque and Speed of Synchronous Machine
Adviser: Fedor, P.
11. Jakubík, P.: Design of a Control System for Production Technology based on PC
Adviser: Fedor, P.
12. Jurčo, P.: A Collection of Educational Programmes for Logic Processor Telemecanique TSX 07
Adviser: Haluška, J.
13. Onufer, J.: Graphic Interface for the Simulation and Control System GAUS
Adviser: Bober, P.
14. Ševc, E.: Development Module for Operation with Circuits FLEXlogic and FX 780
Adviser: Haluška, J.
15. Tiža, R.: Control System for a Frequency Converter based on Transputer T800
Adviser: Bober, P.
16. Vanek, M.: Visualisation of a Washing Box using the CONTROL PANEL
Adviser: Perduková, D.

6.2 Students' Scientific Reports

The International Students' Scientific Conference held in Plzeň, Czech Republic on 24-25 June, 1996. Four students' reports from the Department were presented there. The contributions were published in the Proceedings „Electrical Engineering'96 Conference", West Bohemian University, Plzeň, 1996:

1. Balara D.: Parameters Identification for DC Motor using Neural Networks
pp. 11 - 17 Adviser: Žilková
2. Ivanov, P.: Linear Switched Reluctance Motor
pp. 32 - 42 Adviser: Kostelný
3. Madej, M.: Transformers for Switched Supplies
pp. 49 - 55 Adviser: Kostelný
4. Dzurko, P.: Investigation of the Resonant Converters for their Utilisation in the Current Sources for Arc Welding
pp. 170 - 179 Adviser: Dudrík

7. Information about Staff Members

1. Fields of Research Interests of Teaching Staff Members

Jaroslav Timko, Professor, Ph.D.
Control of AC drives (also linear ones) fed by power electronic frequency converters. Applications of neural networks in electrical drives.

Ladislav Zboray, Professor, Ph.D.
Non-linear state control methods and their application to the control design of drive systems.

Jaroslav Dudrík, Associate Professor, Ph.D.
Analysis, design and control of static power converters, high-frequency resonant and soft switching in DC/DC converters.

Viliam Fedák, Associate Professor, Ph.D.
Application of the advanced control theories for control of single- and multi-motor drives, systems identification and modelling of drive systems.

Jozef Fedor, Associate Professor, Ph.D.
Switching electrical circuits and switching apparatus, applications of power semiconductor devices and circuits for a switching techniques.

Pavol Fedor, Associate Professor, Ph.D.
Software for control and new control methods of electrical drives, parallel and distributed programming and application software for transputer system.

Ján Fetyko, Associate Professor, Ph.D.
Control of electrical drives. Electric servosystems for robots. Non-adaptive and adaptive control of industrial robots.

Michal Girman, Associate Professor, Ph.D.
Software for automation and control systems, parallel and distributed programming-multitasking on PC&LAN and software for transputer systems.

Irena Kováčová, Associate Professor, Ph.D.
Modern power semiconductor switching devices (MOSFET, IGBT, PIN diodes), and their application in power converters.

Michal Kostelný, Associate Professor, Ph.D.
Design of electrical machines, esp. switched reluctance motors of various types (with radial and axial air-gap).

Juraj Oetter, Associate Professor, Ph.D.
New types of power semiconductor converters and their control, microcomputer controlled transistor converters for SRM.

Jozef Ondera, Associate Professor, Ph.D.
Design and control of power semiconductor converters, design of direct-current converter. Applications of converters for illuminating engineering and battery chargers.

Imrich Pokorný, Associate Professor, Ph.D.
Inverters with and without DC line, design of resonant inverters, back influence on supplying lines and higher harmonics elimination in output voltages and currents.

Jaroslav Tomko, Associate Professor, Ph.D.
Modern methods of electrical drives control. Adaptive systems with time delay. Electrical drives for technological lines and vibration machines.

Peter Bober, Assistant Professor, Ph.D.
Parallel programming and simulation, hierarchical and distributed control systems for technological processes.

František Ďurovský, Assistant Professor, Ph.D.
Control of electric drives, esp. state-space control. Design of non-linear observers. Design and debugging of programs for digital control of electrical drives.

Bartolomej Fedor, Assistant Professor, Ph.D.
Switching of electrical circuits, switching devices and equipment. Application of power semiconductor devices and circuits for switching techniques.

Stanislav Fedor, Assistant Professor
Computer control, surface-mounting and hybrid technologies, design of measuring instruments for testing and diagnostic of energetic devices.

Želmíra Ferková, Assistant Professor, Ph.D.
Magnetic fields in electrical machines, esp. in switched reluctance motors.

Juraj Haluška, Assistant Professor, Ph.D.
Digital control systems, above all the multi-processor systems. Reliability of control systems. Multimedia systems.

Marcela Halušková, Assistant Professor, Ph.D.
Variable structure systems, sliding mode operations, control of linear and non-linear systems which have applications in industrial drives problems. Multimedia systems.

Rastislav Harčarufka
Software for real-time systems with parallel or distributed architecture, based on conventional processors and/or transputers, CAD, CASE -technologies, parallel programming, and languages.

Jan Kaňuch, Assistant Professor
Design of disk step motor and disk reluctance motor, also application of CAD methods in design of electrical machines and devices.

Vladimír Kolcun, Assistant Professor
Switched reluctance motors with axial magnetic field, CAD systems for electrical machines and apparatus.

Stanislav Kovalčin, Assistant Professor, Ph.D.
Design and control of power semiconductor converters using microcomputer techniques. Power electronics applications in industrial plants.

Vladislav Maxim, Assistant Professor
Analysis and simulation of power semiconductor converters for supply of switched reluctance motors.

Dionýz Milly, Assistant Professor, Ph.D.
Frequency converters with sinusoidal input and output currents. Control circuits for power converters. Power factor compensation. Switched sources.

Juraj Németh, Assistant Professor
Models of frequency controlled AC machines, esp. with field vector oriented control. Control of electrical drives for vibration machines.

Daniela Perduková, Assistant Professor, Ph.D.
Design methods and control structures for multi-motor drives. Model reference control systems.

Miroslav Tvrdoň, Assistant Professor
Switched reluctance motors with disc rotor. Magnetic fields solution using finite elements method.

Pavel Záskalický, Assistant Professor, Ph.D.
Structures of reluctance step motors. Linear theory of reluctance motors, optimisation of supply and power losses calculation.

Jaroslava Žilková, Assistant Professor
Applications of neural networks in electrical drives.

2. Fields of Research Interests of Research Workers

Peter Košč
Fuzzy logic control and neural networks applications in electrical drives, multimedia systems.

Peter Višnyi
Digital speed and position control of electric machines, extremely high dynamic performance and precise electrical drives of small power.

3. Supported and Technical Staff

Veronika Majerníková, secretary

Katarína Gočová, economist

Gabriela Brečková, technician

Františka Dorčáková, technician

Vasiľ Graban, technician

8. Current Postgraduates in 1996/97

Dušan Balara, full-time Ph.D. student, the first year
theme: Neural Networks Applications in Electrical Drives
supervisor: Jaroslav Timko

Martin Frena, full-time Ph.D. student, the first year
theme: Control of Multi-Motor Electromechanical Systems
supervisor: Viliam Fedák

Tibor Takáč, full-time Ph.D. student, the first year
theme:
supervisor: Jaroslav Tomko

Le Quang Duc, full-time Ph.D. student, the second year
theme: Control of a Drive with SRM for Vibration Mill
supervisor: Jaroslav Tomko

Ján Skonc, full-time Ph.D. student, the third year
theme: Microcomputer Systems in Control of Electrical Drives
supervisor: Michal Girman

Stanislav Fedor, Assistant Professor, the third year
theme: Fuzzy Controller with Disturbance Identification according to the Lyapunow Method
supervisor: Pavol Fedor

Juraj Németh, Assistant Professor, the third year
theme: State Control of a VSI-Fed Asynchronous Motor
supervisor: Jaroslav Tomko

Rastislav Harčarufka, Assistant Professor, the fourth year
theme: Fuzzy Control of Synchronous Motor Drive
supervisor: Pavol Fedor

Kolcun Vladimír, Assistant Professor, the fourth year
theme: SRM with Axial Air Gap - Construction and Measurement
supervisor: Michal Kostelný

Jaroslava Žilková, Assistant Professor, the fourth year
theme: Control of AC Drive by Neural Network
supervisor: Jaroslav Timko

Further postgraduates (having finished their study and writing thesis)

Tvrdoň Miroslav, Assistant Professor
theme: Switched Reluctance Motor with Axial Air Gap $2p_1/2p_2=6/4$
supervisor: Michal Kostelný

Čverčko Ján, external form (research worker, VSŽ Košice)
theme: Adaptive Control of Strip Elongation in the Finishing Cold Strip Mills
supervisor: Ján Fetyko

Kaňuch Ján, Assistant Professor
theme: Disc Step Motor with Axial Air - Gap
supervisor: Michal Kostelný

Maxim Vladislav, Assistant Professor
theme: Steady - State and Transient Analysis of Converter for SRM
supervisor: Juraj Oetter

9. Teaching and Research Laboratories

At the Department there are 19 laboratories. They are used both for research and teaching. The most important are:

- two laboratories for teaching of general electrical engineering subjects,
- three specialised laboratories for power electronics, one for electronics,
- three computer laboratories for CAD design and simulation in electrical drives, power electronics and electrical machines (ANSYS, MATLAB, PSPice, and other programs),
- two specialised laboratories for electrical drives and servosystems based on industrial systems,
- three laboratories for electrical machines.

10. Other Activities

10.1 Membership in Other Organisations

1. International Professional Societies

- EPEA (European Power Electronics and Drives Association - Brussels): Fedák - member
- PEMCA (Power Electronics and Motion Control Association - Budapest) - established in 1996: Fedák, Timko - members of the committee

2. Members of the Programme and Steering Committees of the International Conferences

- ISIE'96, Warsaw: Fedák
- PEMC'96, Budapest: Fedák, Timko
- EDPE'96, High Tatras: Fedák (chairman), Fedor J., Fetyko, Timko, Zboray

4. National Professional Bodies and Societies

- Technical Standards Commissions: Ferková (Electrical Machines), Pokorný (Electrical Devices and Measurement)
- Grant Agency for Technology: Fedák
- SES (Slovak Society for Electrical Engineering) - members: Fedák, Fedor, J., Fetyko, Kaňuch, Kováčová, Ondera, Pokorný, Timko, Tomko, Zboray.

10.2 Seminars, Conferences and Meetings

1. Scientific Seminars at the Department

Each month a scientific seminar is organised by the Department where results achieved in research and the results of works of Ph.D. students are presented. Some seminars were organised in co-operation with the Slovak Society for Electrical Engineering and they were led by specialists from well known companies:

2. International Conference on Electrical Drives and Power Electronics - EDPE'96 and the Industry Day

The EDPE Organising Committe from the Department organised the very successful 12th EDPE'96 conference held in hotel ACADEMIA, Stará Lesná (the High Tatras) on 1-3 October. 124 papers were chosen from 180 delivered abstracts and they were presented there in nine oral, four dialogue and three invited plenary sessions. Number of participants reached 160 from 18 countries and they enjoyed very much their stay there. Two volumes of the proceedings contain 650 pages (in English) and is still available at the Department.

This year an another, new event preceeded the conference, prepared by the EDPE Organising Committee. It was The Industry Day held on 30 September on the same place and was devoted to dissemination of know-how, experiences and advances in fields of electrical motors, drives and power electronics. The meetings and lectures were accompanied by the round-table discussion on the latest development trends in the field and by an exhibition of the products. The proceedings on 100 pages contains the contribution presented there (in Slovak).

3. High-Tech Workshop, Herľany 1996

On April 19 - 21 the Seventh Scientific Workshop on Advances in Industrial Control was successfully organised by staff members of the Division of Automation of Electrical Equipment in the re-training centre of the Technical University in Herľany, near Košice. The workshop was devoted to exchange the knowledge between the departmental staff and industrial specialists.

4. Participation in other Conferences and Meetings

- Seminar Texas Instruments, Bratislava (27 - 28 Feb.): Ďurovský, Fetyko
- Meeting of university teachers of electrical machines (from Czech and Slovac Republics). University of Transport and Communication, Žilina (23 -25 Jan.): Kostelný, Ferková, Kaňuch
- International Conference microCAD'96, University of Miskolc, Hungary, 28 Feb.: Participants: Fetyko, Kováčová, Milly, Tomko
- Meeting of university teachers in general electrical engineering, SEKEL'96, Stará Lesná, 27-28 Sept., Kovalčin, Németh, Maxim, Milly, Tomko, Žilková
- Meeting of university teachers of electrical drives and power electronics, SYMEP'96, VUT Brno, 10-12 Sept.: Ďurovský, Fedor P, Fetyko, Tomko

- A Course on Fuzzy Logic Control, Ostrava-Poruba, 29 Oct.-1 Nov., Frena, Takáč

5. Short Specialised Courses - External Lectures

A series of short specialised courses was prepared partly supported by the TEMPUS JEN 02177 project both for the target group members (see subchapt. 10.3) and for interesting participants from other industrial enterprises:

- Automatic Design - program AUTOCAD (3 days) — Kovalčin
- State Control of Electrical Drives (3 days) — Zboray, Ďurovský
- Modern Semiconductor Devices (1 day) — Dudrík
- Industrial Applications of Electrical Drives (2 days) — Tomko
- Digital Signal Processor DSP-56001 and its Applications (2 days) — Višnyi
- Visualisation of Technological Processes (2 days) — Fedor P., Perduková
- New Circuits in Control and Industrial Electronics (2 days) — Oetter
- Modern Power Electronics - Development Trends (3 days) — Bauer
- Fuzzy Logic and Neural Networks Applications for Control of Electrical Drives (3 days) — Vaščák, Žilková
- Signal Processors TMS320C3x of the Texas Instruments (2 days) — Ádám

In 1997 year the Department will further continue with short 1-3 days specialised courses. At present there are prepared 20 topics covering the modern aspects from the electrical engineering. Besides them, there are prepared afurther specialised courses ordered by industrial enterprises.

Courses directly supported by industry:

- Fundamentals and Maintenance of System RS3 (Regula, a.s., Košice, Sept. 96), Fedor P.
- Programming of System Rosemount RS-3 (Regula, a.s., Košice, May 96), Fedor P.
- Hardware of System Rosemount RS-3 (Regula, a.s., Košice, June 96), Fedor P.
- Configuration of System RS-3 (Regula, a.s., Košice, May 96), Fedor P.
- Programming Fundamentals for System RS-3 (Vienna, June 96), Fedor P.
- Advanced Configuration of System RS-3 (Vienna, June 96), Fedor P.
- Course on System SIMATIC S5 (Procesná automatizácia VSŽ, a.s., Košice, March 96), Šándor
- Power Electronics and Electrical Drives }VSŽ, a.s., Košice, Feb., June, Sept., Nov.), Ďurovský, F. Milly D.

10.3 International Co-operation

1. International Projects

- **Microcomputer-Controlled Electrical Drives in Industrial Automation**

  TEMPUS JEN-02177SQ-94 Project.
  Period: 1995 - 96
  Co-ordinator: Viliam Fedák
  Contractor: Napier University International Office, Edinburgh, UK
  Consortium: Napier University of Edinburgh, Universidad Politecnica de Valencia, Politecnico di Torino.
  Target group: STU Bratislava, VŠDS Žilina, VSŽ Mart, s.r.o. Košice, VSŽ Remel, s.r.o. Košice, ZPA, a.s Prešov, SEZ, a.s. Krompachy.
  Goals: to exchange mutual experience to maintain the knowledge level, to revise the Bc. Course curriculum, to disseminate the JEP outcomes by organising the short specialised courses for target group members.

- **Information Systems in Industry**

  TEMPUS JEP-09484-95.
  Period: academic years 1995/96 - 1997/98
  Co-ordinator: Prof. Karol Flórián, rector TU
  Contractor: Juraj Haluška
  Institutions involved: TU Košice - Faculty of El. Engineering and Informatics, Faculty of Metallurgy, University of Transport and Communication, Žilina, 1st Private Secondary School Košice, VSŽ Research and Testing Institute, Electronic Control Systems Ltd. Bratislava, Fachhochschule Ulm, University of Calabria, Universita di Salerno, the Nottingham, Trent University, Transtech Parallel System Ltd. UK
  Objectives: Development of Interdisciplinary Studies in a Priority Subject Area: Information Technology.

- **Teaching and Training in Electrical Drives and Machines Automation for Under- and Post-Graduate Students**

  CEEPUS Network Project No BG-7:
  Period: 1996 - 1997
  Co-ordinator (Sofia): Prof. Dr. Eng. Roman Litchev
  Co-ordinator (Wroclaw): Prof. Dr. Teresa Orlowska-Kowalska
  Co-ordinator (Košice): Viliam Fedák
  Organisations involved: Technical University Sofia (Dept. of Electrical Drives and Automation, Technical University of Wroclav (Institute of Electrical Machines and Drives), Technical University of Košice (Dept. of Electrical Drives)
  Objective: Implementation of an optimised continuous modern and efficient teaching/training process in electrical drives and machine automation

- **The Use of Modern Computer Methods in the Electrical Engineering Education**

  CEEPUS Network Project No SK-14
  Co-ordinator (Bratislava): Prof. Dr. Ľudovít Klug
  Co-ordinator (Košice): Michal Kostelný
  Organisations involved: Technical University of Košice (Dept. of El. Drives), Slovak Technical University Bratislava (Dept. of El. Machines and Devices), Technical University Budapest (Dept. El. Machines), Silesian Technical University of Gliwice (Dept. of El. Machines), University of Ljubljana (Dept. of Electrical Machines)

  Objective: Exchange of experiences with utilisation modern methods in education and research in Electrical Machines, Power Electrical Engineering, High Voltage Technique, Electromagnetic Compatibility and Testing Methods. Solution of ecological problems, magnetic fields in electrical machines by FEM, solution of problems of electromagnetic compatibility.

2. Visits to Foreign Institutions

- International Symposium on Industrial Electronics - ISIE'97, Warsaw, Poland (17-20 June), Višnyi P.
- microCAD'96 Conference, University of Miskolc (28-29 Feb.), Fetyko J., Tomko J., Kováčová I., Milly D.
- Int. Workshop Courses for Integrated Energy Engineering Programmes with European Studies, University of Miskolc (4 July), Fedor, J., Fetyko, J., Kovalčin S.
- Napier University of Edinburgh, UK (22 June - 12 July) Fedák V. Granted by the TEMPUS JEN 02177 project.
- Napier University of Edinburgh, UK (20-30 October) Fedák V. Granted by the TEMPUS JEN 02177 project.
- SIEMENS Erlangen, Germany (6-9 May) - Tomko J., Ďurovský F. Fedor P., Maxim V., Milly D. - visit of the enterprise accompanying a group of students

3. Study Stays Abroad

Staff:

- Kolcun V.: Technical University of Budapest, Hungary (26 Feb.- 26 March). Granted by the CEEPUS Project N° SK-14
- Ferková Ž.: University of Ljubljana, Slovenia (22 April - 11 May). Granted by the CEEPUS Project N° SK-14
- Bober P., Harčarufka R. - Fachhochschule Ulm, Germany (14-27 April). Granted by the TEMPUS JEP-09484-95
- Košč P. - Fachhochschule Ulm, Germany (23-27 April). Granted by the TEMPUS JEP-09484-95

- Halušková M., Haluška J. - Nottingham, UK (27 April - 11 May). Granted by the TEMPUS JEP-09484-95
- Bober P., Košč P., Halušková M. - Facolta di Ingegneria, Benevento, Italy, (31 May - 11 June), Granted by the TEMPUS JEP-09484-95
- Haluška J.: - Facolta di Ingegneria, Benevento, Italy, (31 May - 8 June), Granted by the TEMPUS JEP-09484-95

Students:

- Ivanov P.: Technical University of Budapest, Hungary (26 Feb.- 26 March). Granted by the CEEPUS Project N° SK-14

4. Foreign Visitors

Staff:

- Dodds, S.J., University of East London, UK, May 1996

Students:

- Benedičič, B., postgraduate student, University of Ljubljana, Slovenia (5 - 26 June), granted by the CEEPUS Project N° SK-14

10.4 Joint Projects with Industrial Sector

1. System SIMATIC 50 - course and training. Procesná automatizácia VSŽ, a.s., Košice. Project N° 1/0415/96. Co-ordinator: Šándor, grant: 30.000 Sk
2. Design and Realisation of a Driving Synchronous Motor for Hydrodynamic Pump - design and construction of the model. Siemens Automotive, s.r.o., Michalovce. Project N° 2/0415/96. Co-ordinator: Kostelný, grant: 200.000 Sk
3. Artep, a.s., Košice. Project N° 3/0415/96. Co-ordinator: Fedor P.
4. Solution of Adaptation in the Gas Mixing and Increasing Station. VSŽ Teplá valcovňa, Košice. Project N° 8/0415/96. Co-ordinator: Tomko, grant: 256.000 Sk
5. Simulation of Dynamic States for Cold Mill Tandem Factory - co-operation at solution of the research. VSŹ, a.s., Košice. Project N° 13/0415/96. Co-ordinator: Tomko J., grant: 225.000 Sk
6. Control System of Pumping Station for Heating Plant - technical co-operation. TEKO - Tepláreň Košice. HZ Project N° 16/0415/96. Co-ordinator: Timko J., grant: 197.000 Sk
7. Advisory Activities at Solution of Tasks from Field of Control of Technological Processes. Regula, a.s., Košice. Co-ordinator: Fedor P., grant: 11.000 Sk/monthly

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