Department of Electrical Drives

Annual Report 1993

Department of Electrical Drives
Faculty of Electrical Engineering
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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.
Assoc.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.: Stanislav Kovalčin Ph.D.

Section of Electrical Machines and Apparatus

Chief of section: 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. Ján Kaňuch
Marián Kerestúri - Ph.D.Student
Miroslav Tvrdoň - Ph.D.Student
Vladimír Kolcun - Ph.D.Student

Section of General Electrotechnics

Chief of section 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. Róbert Šándor
Assist.Prof. Jaroslava Žilková

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

Division of Motion and Process Control Technology

Chief: Assoc.Prof. Pavol Fedor Ph.D.

Members: Assoc.Prof. Viliam Fedák Ph.D.
Assoc.Prof. Michal Girman Ph.D.

Assist.Prof.Juraj Haluška Ph.D.
Assist.Prof.Ladislav Kiovský
Assist.Prof.Stanislav Fedor
Assist.Prof.Daniela Perduková
Assist.Prof.Peter Bober Ph.D.
Assist.Prof. Peter Košč

Rastislav Harčarufka	- research worker
Jaroslav Maxim	- Ph.D.Student
Do Quoc Vu	- Ph.D.Student

Other members:

Katarína Gočová	- technician
Veronika Majerníková	- secretary
Viera Svetozarovova	- technician
Anton Nagy	- technician
Vasil Graban	- technician
Gabriela Brečková	- technician
Peter Paľa	- 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 directhy under the quidance of the department. The specialized line of study is given by students choice of electives. 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 prepared 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 .

Subjects given by Department in 1993

Third year of study

Specialization: Electrical Drives
Power Electronics
Electrical Machines and Apparatus
Motion and Process Control Technology

Subjects	Winter Semester	Summer semester	Lecturer
ED300 Electrical Machines I.(4/3)	x		Kostelný
ED310 Power Electronics (3/3)	x		Dudrík
ED330 Computer in Electrical Engineering (2/3)	x		Girman
ED321 Electronics (4/3)	x		Oetter
ED332 Logical Control of Electrical Drives (2/2)	x		Girman
ED334 Individual Project (0/4)	x		-
ED301 Electrical Máchines II.(2/3)		x	Kostelný
ED336 Applied Electronics (2/2)		x	Haluška
ED302 Electrical Machines for Automatization (3/3)		x	Kostelný
ED333 Control Systems Softvare (2/2)		x	Girman
ED335 Microelectronics (3/3)		x	Haluška
ED312 Modelling and Measurement of Control Circuits (1/3)		x	Kováčová

Fourth year of study

Subjects	Winter Semester	Summer semester	Lecturer
ED400 Electrical Apparatus (3/3)	x		Fedor J.
ED401 Electrical Machines Design I.(2/4)	x		Struckel
ED420 Electrical Drives (4/4)	x		Timko
ED415 Power Electronics Laboratory Practice (0/2)	x		-
ED410 Control Electronics (3/3)	x		Oetter

ED422 State Control of Electric Drives (3/3)	x		Zboray
ED431 Modelling of Drive Systems (2/2)	x		Fedor P.
ED430 Control System Design (3/3)	x		Haluška
ED402 Electrical Machines Design II.(4/2)		x	Struckel
ED403 Electrical Apparatus Design (4/3)		x	Fedor J.
ED404 Individual Project (0/2)		x	-
ED435 Computer Aided Design (0/4)		x	Fedor,S.
ED411 Power Semiconductor Converters I. (3/3)		x	Ondera
ED425 Variable Speed Drives for Automation (4/3)		x	Tomko
ED413 Modelling of Converters (2/2)		x	Kováčová
ED414 Electrical Drives Design (3/3)		x	Pokorný
ED421 Variable Speed Drives (4/3)		x	Zboray
ED432 Control Elements of Electrical Drives (2/3)		x	Fedor P.
ED433 Production Processes Identification (2/3)		x	Fedák V.
ED434 Control Electronic Circuits		x	Kiovský

Fifth year of study

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 (3/1)	x		Kostelný
ED510 Power Semiconductor Converters II. (2/3)	x		Ondera
ED511 Semiconductor Converters Design (3/4)	x		Pokorný
ED521 Selected Industrial Drives (2/2)	x		Tomko,Fetyko

ED512 Microcomputer Control of Converters (2/2)	x		Višnyi P.
ED520 Control of Robots and Manipulators (3/2)	x		Fetyko
ED530 Control of Complex Drive Systems (3/3)	x		Fedák V.
ED531 Control Systems of Technological Plants (2/3)	x		Girman
ED532 Technology of Electrical Devices (2/2)	x		Fedor S.
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. State control of electrical drives

Supported by Ministry of Education, Grant No 9413 GA

Research activity of this group is concentrated on:
- State control design for nonlinear systems
- Nonlinear observer design for DC and AC drives
- Variable structure state control of drives
- Control of the two-mass drive system with elastic coupling
- State control of robot servosystems

Associated Faculty: Ladislav Zboray, Jaroslav Tomko, Ján Fetyko, Marcela Halušková, Stanislav Pčola, František Ďurovský, Juraj Németh, Miroslav Nagy, Ľudovít Višnyi, Karol Daubner, Róbert Šándor

Presentation of achieved results:

- State control design of a dc motor with observer for current and speed identification
- Non-linear state control with linear observer for an asynchronous motor fed by current source inverter was designed

- State control design for a dc and synchronous motor with system order reduction
- Control design for a vibration mill (application of patent)
- Realization of two transducer types: frequency to voltage and frequency to binary code
- Adaptive control design servo-unit of robot by means of dynamic model and by trajectories optimalization.

Relevant publications (see section 6 "Publications")
[3],[6],[10],[11],[22],[25],[28]

2. Progressive Control of AC electric drives fed by power semiconductor frequency converters
   Supported by Ministry of Education, Grant No 9409 GB

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, Dobroslav Kováč

Presentation of achieved results:

- Digital adaptive control of electrical drive with an asynchronous motor was finished
- Realization of the adaptive control structure of an asynchronous motor fed by frequency converter, which is valid to compensate the change of parameters an asynchronous motor
- Fuzzy theory application for control design of the asynchronous motor drive

- New method of resonant converter control was developed.

Relevant publications (see section 6 "Publications")
[1],[2],[5],[8],[16],[17],[18],[20],[21],

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, Pavol Fedor, Viliam Fedák, Juraj Haluška, Ladislav Kiovský, Stanislav Fedor, Daniela Perduková, Rastislav Harčarufka, Peter Bober, Jaroslav Maxim, Peter Košč

Presentation of achieved results:
- Prototype of the GAUS system was finished

Relevant publications (see section 6 "Publications"):
[4], [7], [12], [15], [19]

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: Jozef Fedor, František Magyar, Juraj Oetter, Michal Kostelný, Bartolomej Fedor, Pavol Struckel, Dionýz Milly, Želmíra Ferková, Vladislav Maxim, Ján Kaňuch, Marián Kerestúri, Miroslav Tvrdoň, Vladimír Kolcun

Presentation of achieved results:

- Prototype development of the switched reluctance motor $2p_1/2_2=6/4$, 3kW
- Electromagnetic design of the switched reluctance motor with radial air gap and the realization of the motor prototype
- Utilization of the final elements theory for the magnetic field determination
- Development and realization of power transistor converter for the switched reluctance motor and control circuit based on microcomputer
- Complete measurements of the switched reluctance motor drive characteristics
- Stability research of the switched reluctance motor run
- Development and realization of the disk step motor with axial air gap
- Research of the supply unit for the voltage source inverter
- Determination of the exciting components of the noise in asynchronous motor fed by frequency converter.

Relevant publications (see section 6 "Publications")
[9],[13],[14],[30]

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 Dudrik
Associate Professor
Ph.D., The Technical University of Košice, 1986
He is interested in area of power electronics. His research work includes analysis, design and control of static power converters. 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 circuits 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 transistor 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 circuits 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 obtain ed 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 and dc/dc 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
Associate 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 area of interest is power electronics. He works in field of frequency changers PWM with sinusoidal input current

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.

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 electrical machines

Róbert Šándor
Assistant Professor
His field of interest are electrical drives, control electronics and automatization technics

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

Research Workers

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, langnages, etc.

František Magyar
Ph.D., The Technical University of Transport and Communications of Žilina, 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] Dudrík,J.: Zdroj prúdu pre oblúkové zváranie, Elektro 11/93
(Current source for arc welding), Elektro 11/93, pp.394-399

[2] Kováčová,I.: A new connection of three phases rectifier, Transaction of the Technical University of Košice, No.3, 1993

[3] Nagy,M.: Microprocessor control of a DC motor with observer. Transactions of TU, Riecansky Sc. Publ. Oxford 1993, No.3)

6.2 Conference Papers

[4] Bober,P., Fedor,P.: Pohon s asynchrónnym motorom s reguláciou rýchlosti od nuly.
(AC drive with speed control from zero). XXIII. celostátni konference o el. pohonech, Plzeň 8.-10. jún 1993

[5] Dudrík,J.: Nepriamy jednosmerný menič ako zdroj prúdu,
(Indirect DC/DC converter as a current source) , Zborník z 9. medzinárodnej vedeckej konferencie, Žilina, pp.187-190

[6] Ďurovský,F.: Experimental drive with CSI-fed asynchronous motor. Microcad Int. Conf. Miskolc 1993, pp.13-20

[7] Fedor,P.: Dynamické riadenie pohonu so synchrónnym motorom.
(Dynamic control of drive with synchronous motor). Zborník 2/1 z 9. medzinárodnej vedeckej konferencie, Žilina 14.-16. september 1993

[8] Fedor,P., Timko,J., Kováč,D.: Simple dynamic control of the synchronous motor drive, Proceeding from the 7-th International Conference on Electrical Machines and Drives, Varna 1993, pp. 341-345

[9] Ferková,Ž., Oetter,J.: Einfluss der Schaltwinkel auf das Verhalten des geschalteten Reluktanzmotors. Článok publikovaný na konferencii microCAD-SYSTEM 93 usporiadanej TU v Miskolci v dňoch 2. až 6. (Switching angle influence on switched reluctance motor parameters).

[10] Fetyko,J.: Dynamic feed-forward control of robot axis. Microcad Int. Conf. Miskolc 1993, pp.21-28

[11] Fetyko,J.: Servopohon robota s dynamickou predkorekciou.
(Servo-unit of the robot with dynamic precorrection). Zborník konf. ROBTEP Prešov 1993, pp.101-104

[12] Haluška,J.: The innovation of older types of powder x-ray difractometers, Zborník RPDK-2,2. Regionálna česko-Slovenská konferencia o práškovej difrakcii 8.-10.jún 1993 Liptovský Mikuláš

[13] Kostelný,M., Kaňuch,J.: Step motor with axial air gap with step 1 Medz. konf. o malých el. strojoch, ČVUT Praha, 16.-17.sept. 1993

[14] Kostelný,M., Tvrdoň,M.: Switched reluctance motor with disc rotor. Medz. konf. o malých el. strojoch, ČVUT Praha, 16.-17. sept. 1993

[15] Košč,P., Fedák,V., Profumo,F.: AC drives for high performance applications using fuzzy logic controllers, Power Conversion Conference, 1993, Yokohama, Japan

[16] Kováč,D.: Trojfázový napäťový menič frekvencie s MOSFETmi pre napájanie asynchrónneho motora s kotvou nakrátko.
(Three phase voltage frequency converter with MOSFETs for feeding of a squirrel-cage induction motor). Zborník z 9. medzinárodnej vedeckej konferencie, Žilina 1993 , pp.121-126

[17] Kováčová,I.: Optimalizačný postup pri návrhu zapojení unipolárnych tranzistorov vo výkonových obvodoch meničov.
(Optimalization method of the design of unipolar transistors connection in power semiconductor converters). Zborník z 9.medzinárodnej vedeckej konferencie, Žilina 1993, pp.117-120

[18] Kováč,D.,Kováčová,I.: Microcomputer controlled drive with MOSFETs for high speed DC motors, Proceeding from the 7-th International Conference on Electrical Machines and Drives, Varna 1993, pp.7-13

[19] Pavluš,M., Purcz,P., Bober,P.: Algoritmus LU rozkladu na riešenie lineárnych systémov algebraických rovníc s hustými maticami. (Algorithm of LU decomposition for linear system of algebraic equations with compact matrices).Zborník ALGORITMI 93, Sympózium ALGORITMI 93, Vysoké Tatry, Stará Lesná, apríl 1993

[20] Timko,J., Žilková,J., Vdovjak,M., Fedor,P.: Simulation of speed control of the linear induction motor, Proceeding from the 7-th international conference on electrical machines and drives, Varna 1993, pp.449-456

[21] Višnyi,P., Pokorný,I.: Riadenie frekvenčného meniča s rezonančným medziobvodom.
(Control of resonant frequency converter). Zborník z 9. medzinárodnej vedeckej konferencie, Žilina 1993, pp.127-132

[22] Zboray,L.: State control design with system order reduction. Proc. 9. Int. Conf. Žilina 1993, vol.1, pp. 69-74

6.3 Theses

[23] Kováčová,I.: Výkonové poľom riadené tranzistory a ich použitie vo výkonovej elektronike (Application of power field efect transistors in power electronics).
(habilitation thesis - in Slovak) Košice, EF TU 1993, 123 p.

[24] Bober,P.: Číslicové riadenie pohonu s asynchrónnym motororom.
(Digital control of AC drive)
(Ph.D. thesis - in Slovak) Košice, EF TU 1993

[25] Ďurovský,F.: Stavové riadenie asynchrónneho motora s nelineárnym pozorovateľom.
(State space control of an asynchronous motor with nonlinear observer)

(Ph.D. thesis - in Slovak) Košice, EF TU 1993

6.4 Textbooks

[26] Struckel.P.: Výroba elektrických strojov. (Electrical Machines Production) 1.ed. Košice, ED TU 1993 (in Slovak)

[27] Fedák,V.,Nagy,J.,Radacs,L.,Kovalčin,S.: Power Electronics: Circuits, Devices and Applications. Politecnico di Torino, 1993 (in English)

6.5 Other publications

[28] Daubner,K.,Tomko,J.: Kompenzácia a aktivácia odstredivých síl vibračných zariadení pomocou riadenia el. pohonu. PV 1176-93
(Centrifugal forces of vibration devices compensation and activation owing to control of electrical drive - application of patent)'

[29] Čverčko,J.: Regulácia ťahu v páse na hotovnom poradí TŠP 1700
(Tension control of hot strip finishing mill TSP 1700)
(Report to Ph.D. thesis - in Slovak), EF TU 1993

[30] Ferková,Ž.: Príspevok k teórii reluktančného motora
(Contribution to the theory of switched reluctance motor)
(Report to Ph.D. thesis - in Slovak), EF TU 1993

7. Current Postgraduates

Ph.D. Students in 1993

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

2. Čverčko 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

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

6. Kaňuch Ján: MSc. 1987, TU Košice
   Ph.D., dissertation title:
   The disc step motor with axial air gap
   Thesis Advisor: Michal Kostelný

7. Kerestúri Marián: MSc. 1990 TU Košice
   Ph.D., dissertation title:
   Power switches without backward influence

   Thesis Advisor: Jozef Fedor

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

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

10. 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

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

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

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

14.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

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

16.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

17.Jaroslav Kinlovič: MSc. 1986 TU Košice
Ph.D., dissertation title:
Indirect DC to DC converter
Thesis Advisor: Jaroslav Dudrík

18.Robert Šándor: MSc. 1981 TU Košice
Ph.D., dissertation title:
AC drive of vibration mill
Thesis Advisor: Jaroslav Tomko

19.Do Quoc Vu: MSc. 1992 TU Košice
Ph.D., dissertation title:
Fuzzy control of synchronous motor drive
Thesis Advisor: Pavol Fedor

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 next conference will be held on October 18-20, 1994 in High Tatras.

1. 9. Int. Conference, Žilina, September 1993, Dudrík,J., Kováčová,I., Kováč,D., Zboray,L., Višnyi,P., Do Quoc Vu

2. XXIII th Conference "Electrical Drives", Plzeň, June 1993, Bober,P., Ďurovský,F., Ondera,J.

3. 22 th Regional Czecho-Slovak Conference about Powder Difraction, June 1993, Haluška,J.

4. Symposium Algoritmi 93, High Tatras - Stará Lesná, April 1993, Bober,P.

5. Microcad Int. Conference, Miskolc, March 1993, Fetyko,J., Ďurovský,F., Ferková,Ž., Magyar,F., Košč,P.

6. Conference ROBTEP 93, Prešov, September 1993, Fetyko,J.

7. International Workshop on FHP Electrical Machines, June 1993,

Kostelný,M., Tvrdoň,M., Kaňuch,J.

8. Workshop "State Control of Electrical Drives", Miskolc, February 1993, Fetyko,J., Ďurovský,F., Zboray,L.

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, Universidad Politecnica de Valencia and Politecnico di Torino. The Project is aimmed at the folloving areas: 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 Electrical Engineering Course for Bachelor (Bc.) Degree

The study course of Electrical Engineering is organized at the Department of Electrical Drives. The study course, offered by the Department of Electrical Drives arose on the basis of the Tempus Joint European Project accepted by EC Tempus Office Brussels in 1991. The normal course duration is 3 years.
The Bc. course "Electrical Engineering" has been chosen for its most general meaning while it covers these main lines of study:
Electrical Machines and Apparatus, Power Electronics, Electrical Drives, Motion and Process Control Technology. The Bc. study programme offers wide specialization (including business and management) with the aim to educate the graduates to be well adaptable to industry requirements.
The course was accredited by the Scientific Board of the Faculty of Electrical Engineering, Technical University of Košice on June 25 th 1993.

8.5 Study tours

- Fedák,V.: Politecnico di Torino, February-June 1993
- Kovalčin,S.: Politecnico di Torino, May-June 1993
- Fedor,J., Struckel,P.: Universidad Politecnica de Valencia, June 1993
- Košč,P.: Politecnico di Torino, January-March 1993
- Uhrín,R.: Politecnico di Torino, 1993
- Ďurovský,F.: National Polytechnique de Lorraine, Nancy, France, Apríl 1993

8.6 Visitors

January 1, 1993 - December 31, 1993

Prof. Jean Claude Braun
Ecole Nationale Supérieure
d Electricité et de Mécanique
France.

Prof. D. Maillet
Ecole Nationale Supérieure
d Electricité et de Mécanique
France

Mrs. Christine Turner
Napier University
Ventures Limited European Office
United Kingdom

Dr. Ing. Mieczyslav Zajac
Institut Elektrotechniky Varšava
Poland

Mgr. Ing. Vieslav Juszczyk
Institut Elektrotechniky Varšava
Poland

Prof. Sinclair Gair
Napier University of Edinburgh
United Kingdom

Prof. Tivadar Szarka
Technical University of Miskolc
Hungary

8.7 Joint Projects with Industrial Sector

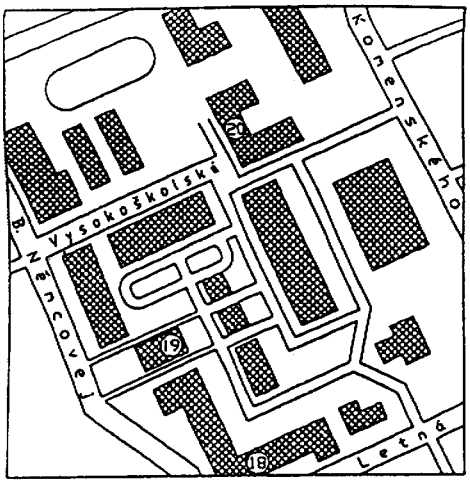
1. Tomko,J. at al: Design of the control algorithm for coiler

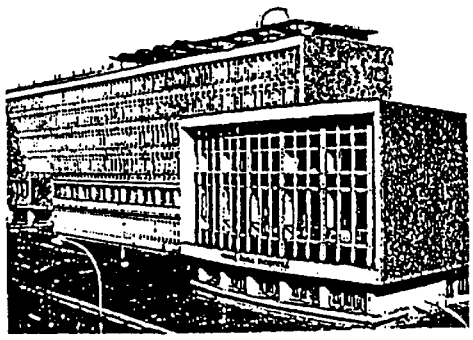
2. Tomko,J. at al: Feed transformators analysis of main drives exciting circuits of hot strip finishing mill

3. Fedor,J. at al: Design of indoor type disconnector with electrical motor drive - 1 kV, 4000 A

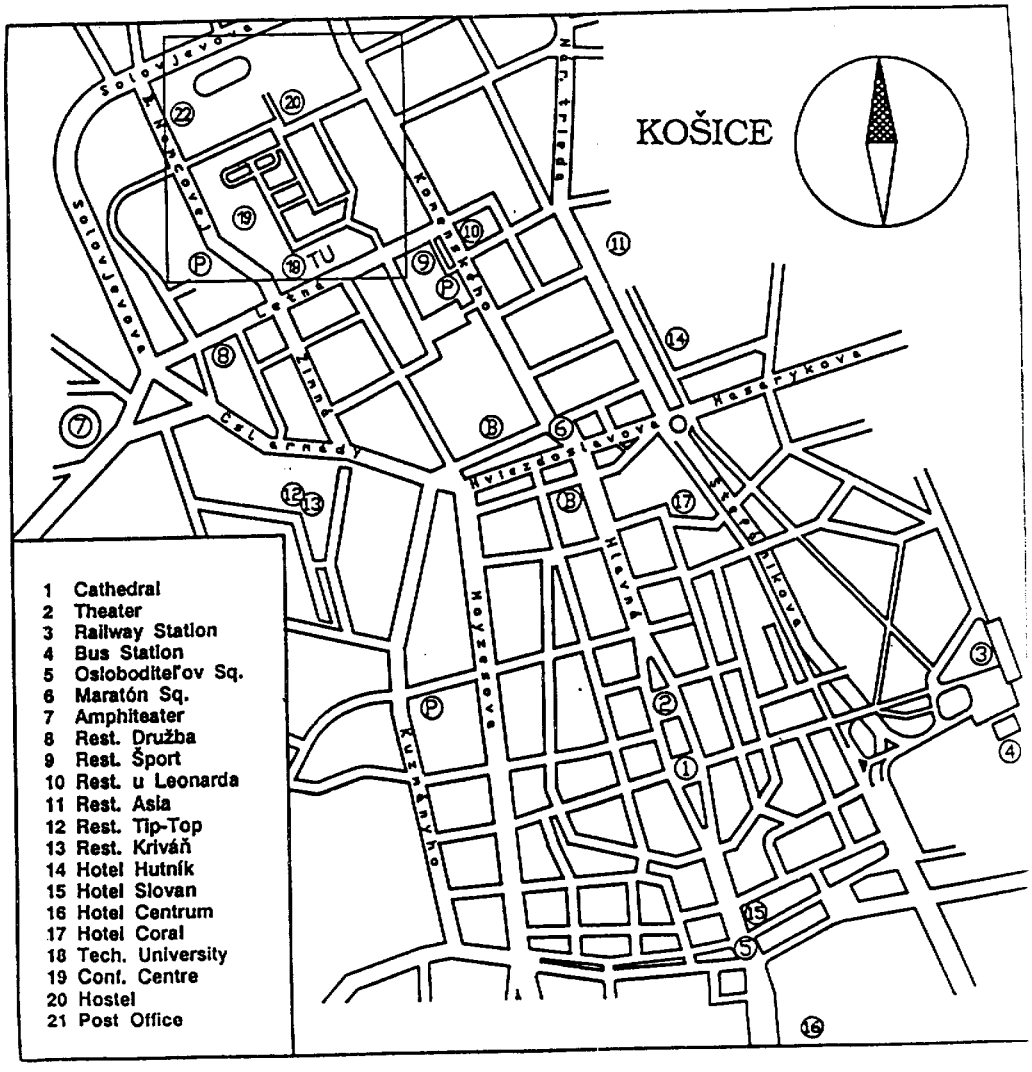
4. Fetyko,J., Fedák,V.: Control tension analysis of hot strip finishing mill

Editor: Dudrík,J.





Technical University of 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