

**Institute of the Theory of Electrical
Engineering and Electrical
Measurements**

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**Department of Electrical Engineering
Warsaw University of Technology**

WARSAW UNIVERSITY OF TECHNOLOGY

**Institute of the Theory of Electrical
Engineering and Electrical
Measurements**

**ANNUAL REPORT OF
SCIENTIFIC ACTIVITY
IN 1995**

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I. SCIENTIFIC ACTIVITY OF THE INSTITUTE

1. OPTIMIZATION AND INVERSE PROBLEMS IN ELECTROMAGNETIC FIELD THEORY

- S. Bolkowski, J. Sikora, S. Wincenciak, J. Starzynski, J. Korytkowski, M. Stodolski

Problem of analysis of electromagnetic fields: problem oriented language for field analysis; nonstandard elements for finite element method; neural network technique for mesh generation; pre- and postprocessing for data and results (visual presentation including animation); electric thermal coupled fields and eddy current problems (3D). Synthesis: efficient techniques for sensitivity analysis; optimization algorithms for nonlinear problems; identification of source functions and boundary conditions (application for computerized electrocardiography); optimal shape design; material structure identification.

2. ARTIFICIAL NEURAL NETWORK APPLICATION TO ELECTRICAL IMPEDANCE TOMOGRAPHY

- J. Sikora

Artificial Neural Network (ANN) application to inverse problem solution in particular for electrical impedance tomography, where the time of the solution is a very crucial point, algorithms of learning adjusted to impedance tomography, applications in different branches of engineering.

3. MATHEMATICAL MODELS DESCRIBING THE INTERACTION OF THE COUPLED FIELDS ON THE CONTINUOUS MEDIA

- S. Krzeminski

Constitutive modeling of the interaction of the electromagnetic fields and moving electrodynamic media, methods of homogenization of nonuniform structures, analysis of the interaction of the electromagnetic fields and mobile non-Newtonian, electrically conducting fluids moving in the channels of the peristaltic walls, problems of magneto- and electrodynamic flows.

4. SYNTHESIS AND OPTIMIZATION OF POWER ELECTRONIC CIRCUITS

- K. Mikolajuk, Z. Filipowicz, A. Tobola

Synthesis of passive switching circuits: theory of LC switching one-ports and two-ports, creation of new thyristor and transistor switching structures, particularly DC-DC converters, power electronic harmonic compensators, optimization of harmonic reduction in electrical power system, computer simulation of the phenomena in the power electronic circuits.

5. RESEARCH IN THE AREA OF NEURAL NETWORKS

- S. Osowski, A. Cichocki, S. Filipowicz, M. Stodolski, K. Siwek, S. Stepniewski

Study of the properties and applications of neural networks (n.n.); development of new learning rules; feedforward and recurrent n.n.; optimization using n.n., algebraic manipulations using n.n.; adaptive signal processing using n.n.; identification and estimation of signals for signal processing systems using n.n.; application of n.n. in synthesis and design of electrical circuits, location of faults - application of feedforward and Kohonen networks, data compression, predictive properties of neural networks - application to load prediction of power electroenergetic system, neural fuzzy systems - study of learning rules and application in identification and prediction, blind separation of sources - development of new effective learning rules and its application.

6. STUDY OF SINGULAR MULTIVARIABLE AND PARAMETER DISTRIBUTED SYSTEMS - DIRECT AND INVERSE PROBLEMS

- Z. Trzaska

Effective algorithms and computational procedures for analysis, synthesis, identification and design of singular dynamical multivariable systems; analysis and design of manipulators; studies of systems with distributed parameters; criogenic systems, fault diagnostic systems, geometrical approaches to dynamical system problems, electrical car drives; fundamentals and applications of the Fibonacci hyperbolic trigonometry and Fibonacci polynomials; direct and inverse problem solutions for 2-D and N-D systems.

7. THE ELECTRIZATION OF CONDUCTING ENVIRONMENTS IN ELECTRIC AND MAGNETIC FIELD AS SOURCE OF STATIC CHARGES

- H. Rawa

Mathematical modeling and analysis of the process of displacement of free charges towards the surface of the object under electrization in the electric and magnetic field, development of the theory and computer simulation of the phenomena.

8. SIMULATION OF POWER SYSTEM LOADED BY THE HIGH POWER NONLINEAR LOAD

- W. Brociek

Modeling of the elements of power system, interaction of the system and nonlinear load of quickly changing parameters (arc furnaces, traction substations), analysis of higher harmonics using simulation languages including PCNAP and PCSPICE, quality of the delivered energy under nonsinusoidal conditions.

9. SYNTHESIS AND IDENTIFICATION OF PARAMETERS OF THE CURRENT CIRCUIT OF THE THE IMPULSE PLASMA GENERATOR

- T. Karwat

Analytic and experimental investigation leading to the identification of the electrical parameters of the plasma generator, mathematical description of the plasma chamber, quality of the titanium nitride coating of the cutting instruments in the process of thermal - chemical treatment performed in the plasma chamber and its connection with the electrical parameters of the plasma.

10. RESEARCH IN THE AREA OF DYNAMIC SYSTEMS SIMULATION AND OPTICAL CHARACTER RECOGNITION

- M. Stabrowski,

Development of dynamic systems simulation languages, computer implementation of simulation languages in integrated environment; Image processing, computer implementation of typewritten characters recognition of polish national characters, context based methods.

11. RESEARCH IN THE AREA OF PERMALLOY AND AMORPHOUS THIN FILMS

- W. Kwiatkowski, J. Konopa, E. Misiuk

Optimization of manufacturing of thin films, design of optimal layout of thin films for measurement applications, application of thin sensors for measurement of magnetic and mechanical quantities. Studies of the new approach of application of the thermobimetals in the measurement techniques.

12. RESEARCH IN THE AREA OF METHODS OF METROLOGY AND EXPERIMENTATION TECHNIQUES

- J. Jaworski, T. Swiderski, J. Oledzki

Mathematical modelling of physical objects and phenomena, fundamentals of the design and execution of measurement-type and identification-type experiments, design and exploitation of the measuring devices and measuring systems, design and execution of advanced experiments, mathematical methods of the measurement of data processing. Parameter identification concept of measurement, system theory and techniques of experimentation and measurement.

13. RESEARCH IN THE AREA OF OPTIMIZATION OF TEMPERATURE TRANSDUCERS

- J. Czajewski, M. Poninski, B. Zyla

Development of new generation of temperature transducers based on wide range of sensors: metal resistors, semiconductor resistors, thermocouples, junction elements, microcomputer's method of linearization, simulation and hardware implementation.

14. RESEARCH IN THE AREA OF METHODS AND SYSTEMS FOR TESTING MAGNETIC MATERIALS AND SYSTEMS FOR MEASURING IMPEDANCE WITHIN THE ACOUSTIC FREQUENCY RANGE

- J. Oledzki

Parameter identification approach to magnetic material testing, adaptive techniques in testing magnetic materials, e.g. adaptive control of demagnetization, of measurement process, adaptive digital synthesis of magnetizing

current waveform. Methods of identification of two- and three-terminal networks in the harmonic current circuits when model accuracy in a frequency range is specified, computer parameter identification supplemented with an automatic selection of a model structure of adequate accuracy.

15. MAGNETIC FIELD MEASUREMENTS AND THEIR APPLICATIONS

- S. Tumanski, M. Stabrowski

Sensors of magnetic fields, magnetic fields measurements, construction of magnetometers, measurements of power frequency magnetic and electric fields, nondestructive testing of electric steel sheets. Computer controlled measurement system of magnetic fields. Computer aided processing of measurement data.

16. RESEARCH IN THE AREA OF APPLICATION ON MIS STRUCTURES AS NONELECTRICAL QUANTITIES TRANSDUCERS

- B. Moeschke, A. Siedlecki

Analysis of the relation between physical quantities, particularly mechanical and semiconductor materials, application of semiconductors, monocrystalline and polycrystalline structures and p-n structures as nonelectric quantities transducers, application of MIS-structures as nonelectric quantities measurement transducers, experiments with selected structure, designing nonelectric quantities transducer with MIS structure and joint-structure.

17. RESEARCH IN THE AREA OF ELECTROMAGNETIC FLOW MEASUREMENTS IN OPEN CHANNELS

- A. Michalski, A. Kalicki

Study of the features of electromagnetic method, development of new generation of electromagnetic flow meter dedicated for industrial open channels, optimization of primary transducer (coil, electrodes) based on the finite element idea and generalized Newton algorithm, designing small measurements systems based on one chip microcomputers.

18. RESEARCH IN THE AREA OF HIGH RESOLUTION SPECTRAL ANALYSIS, CODING AND ESTIMATION

- Z. Staroszczyk, R. Rak, D. Sawicki, A. Majkowski

Interpolating FFT methods for distorted signals measurements, power systems measurement and identifications, parametric spectral estimation of noisy signals, transfer function measurements, digital filters applications to high resolution spectral analysis, vector quantization of FFT spectrum, two dimensional spectrum/signal presentation.

II. PUBLICATIONS

The results of the scientific activity of the Institute of the Theory of Electrical Engineering and Electrical Measurements, Warsaw University of Technology have been published in 22 journal papers (both international and national) and 67 contributions of the proceedings of the national and international conferences. Below there is a list of papers published in 1995 as well as list of books written by members of the scientific staff of the Institute.

1. THE PAPERS IN SCIENTIFIC JOURNALS: (alphabetical order)

• International journals

1. Cichocki A., Kaczorek T., Mazurek J., Analog neural networks for solving in real time linear inverse and total least squares problem, *Appl. Math. Comp. Sci.*, 1995, vol. 5, pp. 105 - 138
2. Korytkowski J., Wincenciak S., Effectiveness method of analysis of electro-thermal coupled fields, *Shock and Vibration Journal*, John Wiley & Sons, Inc. Publishers, vol. 2, issue 3, 1995, pp.219-226.
3. Osowski S., Herault J., Signal flow graphs as an efficient tool for gradient and hessian determination, *Complex Systems*, 1995,
4. Osowski S., Herault J., Demartines P., Fault location in analogue circuits using Kohonen neural network, *Bulletine Academie Polonaise*, 1995, vol. 43, No 1, pp. 111-123
5. Osowski S., Bojarczak P., Neural network approach to the deconvolution and separation problems, *Bulletine Academie Polonaise*, 1995, vol. 43, No 1 , pp. 125-133

6. Osowski S., Neural network approach to the solution of linear complementarity problems, *Int. Journal of Numerical Modelling, Electronic Networks, Devices and Fields*, 1995, vol. 8, pp. 431 - 445
7. Osowski S., Stodolski M., Bojarczak P., Fast second order learning algorithm for feedforward multilayer neural networks, *Neural Networks*, 1995 (in print)
8. Trzaska Z., On links between continued fractions and modified numerical triangles, *Int. J. CATCF*, Nr 5, 1995
9. Trzaska Z., Analysis of Implicit Hyperbolic Multivariable Systems, *Int. Journ AMM*, Nr 3, 1995, ss. 123-137
10. Trzaska Z., On the Fibonacci hyperbolic trigonometry and modified numerical triangles, *The Fibon. Quart.*, vol. 34, Nr 6, 1995
11. Trzaska Z., Time-Varying Pascal Systems, *Journ. Franklin Institute*, vol.242, 1995, Nr 6, pp. 348-362

• **National journals**

1. Bolkowski S., Osowski S., *Komputerowe Metody w Elektrotechnice - kierunek informatyczny na wydziale Elektrycznym Politechniki Warszawskiej*, *Informatyka Stosowana*, 1995, t. II, Nr 1/95, Lublin, ss. 73 - 85
2. Brociek W., Wilanowicz R., Symulacja zjawisk rezonansowych dla wyższych harmonicznych w liniach zasilających trojfazowe odbiorniki nieliniowe, *Przegląd Elektrotechniczny*, 1995, No. 11, ss. 290 - 292
3. Cala A., Krzeminski S., Analiza oddziaływania pola magnetycznego na przepływ cieczy przewodzącej w otoczeniu walca, *Zeszyty Naukowe, Politechniki Świetokrzyskiej, Elektryka*, 1995, z. 32, ss. 19 - 25
4. Czajewski J., Barlik R., Żagan W., Reforma programu nauczania i zasad studiów dziennych na Wydziale Elektrycznym Politechniki Warszawskiej, *Przegląd Elektrotechniczny*, nr 7/95
5. Jaworski, J.M., Pomiar jako identyfikacja parametryczna modelu matematycznego obiektu mierzonego, *METROLOGIA I SYSTEMY POMIAROWE*, T. II, zes. 1/95, str. 5-23.

6. Krzeminski S., Wlodarczyk M., Analiza pola magnetycznego w układzie 3 magnetyków i przewodnika z prądem, Zeszyty Naukowe, Politechniki Świętokrzyskiej, Elektryka, 1995, z. 32, ss. 137 - 145
7. Kwiatkowska A., Milosz M., Sikora J., Material Derivative Concept for Optimal Shape Design: One Dimensional Case, Archiwum Elektrotechniki, 1995, in print
8. Rymarczyk T., Sikora J., New method of nondestructive testing of the copper-mine ceiling. Archiwum Elektrotechniki, 1995, in print.
9. Stabrowski M., Crafting a compiler of dynamic systems simulation language, Archiwum Informatyki Teoretycznej i Stosowanej, 1994, z.1-4, s.251-263.
10. Stabrowski M., Execution technology in dynamic systems simulation, Archiwum Informatyki Teoretycznej i Stosowanej, 1994, z.1-4, s. 265-276.
11. Trzaska Z., Analysis of distributions of voltages and currents along a SMES coil, Archiw. Elektrotechn., Nr 4, 1995

2. CONFERENCE PROCEEDINGS REPORTS:

• International conferences

1. Barber D., Sikora J., Optimization approach to image reconstruction, Int. Symp. Advanced Computational and Design Techniques in Applied Electromagnetic Systems, S.-y. Hahn (Editor), 1995 Elsevier Science B.V. pp. 113-116.
2. Karwat T., Zdunek K., Distribution of magnetic field in the coaxial accelerator of impulse plasma, 9th Int. Conf. Surface Modification of Metal by Ion Beams, San Sebastian, 1995
3. Krzeminski S., Smialek M., Wlodarczyk M., Second grade electrically conducting MHD fluid flow, Proc. ISEF, Saloniki, 1995
4. Krzeminski S., Cala A., Smialek M., Numerical simulation of 2-D MHD flows, Proceedings of COMPUMAG, Berlin, 1995, pp. 376 - 377 conducting MHD fluid flow, Proc. ISEF, Saloniki, 1995

5. Kurzatkowski T., Milosz M., Sikora J., Electrical Impedance Tomography Based on Higher Order Finite Element Approximation of Conductivity, Int. Symp. Non-Linear Electromagnetic Systems ISEM'95, Cardiff, Wales, UK, Sept.17-20 1995, paper B27
6. Kwiatkowska A., Sikora J., Noise Reduction of Measured Signals Based on the Theory of Fuzzy Sets in Electrical Impedance Tomography, Second Int. Conf. Advanced Methods in the Theory of Electrical Engineering Applied to Power Systems, PILSEN'95 Czech Republic, 1995.
7. Mikolajuk K., Properties of periodically switched passive 1- and 2-ports. 8th Int. Symp. on Theoretical Electrical Engineering, Thessaloniki- Greece, 22-23.9.1995, pp.25-28
8. Mikolajuk K., Optimization of Harmonic Compensators Distribution. Third Int. Workshop Power Definitions and Measurements under Nonsinusoidal Conditions, Milano-Italy, 25-27.9.1995, pp.65-68
9. Milosz M., Sikora J., Nafalski A., New information technology comes to small and medium sized enterprises in Poland. The Technology Transfer in Electrical and Information Engineering - Sixth Annual Conference EAEEIE, Bologna - Italy, 31 May - 2 June 1995.
10. Nafalski A., Panczyk B., Rymarczyk T., Sikora J., Application of Kaczmarz Algorithm in Electromagnetic Field Inverse Problems. The Int. Symp. on Advanced Computational and Design Techniques in Applied Electromagnetic Systems, S.-y. Hahn (Editor), 1995 Elsevier Science B.V. pp. 177-180.
11. Osowski S., Bojarczak P., Deconvolution and separation of signals using neural networks, 1995 IEEE Workshop on Nonlinear Signals and Image Processing, Neos Marmara, 1995, Greece
12. Osowski S., Bojarczak P., Interpolating neural networks and their applications, ECCTD 95, Istanbul, 1995
13. Osowski S., Waszczuk R., Bojarczak P., Image compression using feedforward neural networks - hierarchical approach, IWANN, 1995, Malaga
14. Osowski S., Waszczuk R., Bojarczak P., Improved image compression using neural network and hierarchical approach, Proc. of IEEE ICNN, Perth, Australia, 1995

15. Ratajewicz-Mikolajczyk E., Sikora J., Ultrasonic Effect on the Electrical Field of the Copper Electrodeposition Process. Second Int. Conf. Advanced Methods in the Theory of Electrical Engineering Applied to Power Systems, PILSEN'95 Czech Republic, June 28-30 1995.
16. Ratajewicz-Mikolajczyk E., Sikora J., Ultrasonic Influence on the Electrical Field of the Electrodeposition Process, Int. Symp. Non-Linear Electromagnetic Systems ISEM'95, Cardiff, Wales, UK, Sept.17-20 1995, paper B22.
17. Shirkoohi G. , Sikora J., Wac-Wlodarczyk A., Impedance Tomography as an Effective Nondestructive Testing for Industrial Applications. European Association for Education in Electrical and Information Engineering (EAEEIE) Sixth Annual Conference, 31 May - 2 June 1995, Bologna, Italy.
18. Sikora R., Kwiatkowska A., Sikora J., Fuzzy Sets as a Tools for Image Smoothing in Electrical Impedance Tomography. 4th Japanese-Polish Joint Seminar on Electromagnetic Phenomena Applied to Technology, Oita, Japan, June 5-7, 1995.
19. Sikora R., Rymarczyk T., Sikora J., The Inverse Problem Solution for Infinite Regions Using the Impedance Tomography Technique. COMPUMAG 10th Conference on the Computation of Electromagnetic Fields, Berlin, Germany, July 10-13, 1995.
20. Song-yop Hahn, Hyun-kyo Jung, Il-han Park, Panczyk B., Sikora J., Eddy Current Tomography for NDT, Int. Symp. Non-Linear Electromagnetic Systems ISEM'95, Cardiff, Wales, UK, Sept.17-20 1995, paper E30.
21. Staroszczyk Z., Czarnecki L.S., Chen G., Compensators with thyristor switched inductors operated under degraded power quality: performance and its improvement, Proceedings of the 4th International Conference on Power Quality Application and Perspectives, USA, New York, May 1995.
22. Staroszczyk Z., Czarnecki L.S., On-line measurement of equivalent parameters of distribution system and its loads for harmonic frequencies, Proceedings of the IEEE Instrumentation and Measurements Technology Conference IMTC 1995, USA Boston, April 1995, p. 692-698.

23. Staroszczyk Z., Czarnecki L.S., Dynamic on-line measurement of equivalent parameters of three-phase systems for harmonic frequencies, Proceedings of the 3th International Workshop on Power definitions and Measurements under Nonsinusoidal Conditions, Italy Milano, Sept. 1995.
24. Staroszczyk Z., Czarnecki L.S., Chen G., Application of running quantities for control of adaptive hybrid compensator, Proceedings of the 3th International Workshop on Power definitions and Measurements under Nonsinusoidal Conditions, Italy Milano, Sept. 1995.
25. Trzaska Z., On efficient computing of 2-d system transfer functions, Proc. Int. Workshop on Dynam. Systems, Slippery Rock, (USA) lipiec 1995
26. Trzaska Z., Influences of the phyllotaxis growth on the progress in development of electrical engineering Proc. EAEEIE Sixth Annual Conference, Bologna, 1995.
27. Trzaska Z., Fundamentals and Applications of the Fibonacci Hyperbolic Trigonometry, Proc ICIAM'95, Hamburg, 1995
28. Trzaska Z., Modelling of mechanisms for neurobehavioral effects of electromagnetic exposures , Int. Seminar ENVIR. MODEL. SYSTEMS, Riga (Latvia), październik 1995
29. Trzaska Z., The Fibonacci hyperbolic trigonometry and its applications Proc. Int. ACEEE, Washington (USA), czerwiec 1995
30. Tumanski S., Magneto-resistive Permalloy Sensors in Measurement Applications, Proceedings of the International Society for Optical Engineering, Vol. 2634, 1995, s.129-132
31. Tumanski S., Stabrowski M., The testing device for electrical steel sheets, Proc. 6th European Magnetic Materials and Applications Conference, Wien, p.319, 1995
32. Tumanski S., Magneto-resistive Permalloy sensors in measurement applications, Proc SPIE, v.2634, p.129-132, 1995

• **National conferences**

1. Brociek W., Wilanowicz R., Analiza współpracy urządzenia filtrującego – kompensującego z układem zasilającym odbiornik nieliniowy, XVIII SPETO, Gliwice - Ustron, 1995, ss. 131 - 136

2. Chwaleba A., Kalicki A., Michalski A., Poninski M., Siedlecki A., Zyla B., System do pomiaru przepływu wody i wybranych wskaźników jej jakości VIII Krajowa Konferencja METROLOGII Warszawa - Zegrze 1995 Materiały konferencyjne, tom II, str.201 - 206.
3. Chwaleba A., Kalicki A., Michalski A. Przepływomierz elektromagnetyczny do kanałów otwartych, VIII Krajowa Konferencja METROLOGII Warszawa - Zegrze, 1995, Materiały konferencyjne, tom I, str.323 - 330.
4. A. Cichocki, L. Moszczynski, Improved adaptive algorithms for blind separation of sources, KKTOiUE, Zakopane, 1995
5. Czajewski J., Barlik R., Żagan W., Zasady podziału środków finansowych na Wydziale Elektrycznym Politechniki Warszawskiej, III Konferencja Dziekanów Wydziałów Elektrycznych i Elektroniki, 1995
6. Czajewski J., Barlik R., Żagan W., Ocena efektów modernizacji procesu dydaktycznego na Wydziale Elektrycznym Politechniki Warszawskiej, III Konferencja Dziekanów Wydziałów Elektrycznych i Elektroniki, 1995
7. Czajewski J., Wykorzystanie urządzeń elektronicznych w żeglarskim, Materiały Sympozjum Sekcji Nawigacji Komitetu Geodezji PAN i Wydziału Nawigacyjnego Wyższej Szkoły Morskiej w Gdyni, Gdynia 22 - 23 06. 95
8. Jaworski J. M., Podstawy techniki eksperymentu, MWK-95 (Szkoła - Konferencja: Metrologia Wspomagana Komputerowo), Zegrze k/Warszawy, 1995. Materiały Konferencyjne, T. I, str. 9 -37. Wyd. Wyższej Szkoły Oficerskiej Wojsk Łączności.
9. Karwat T., Zdunek K., Czekalski D., Stanowisko do badania pola magnetycznego w akceleratorze generatora plazmy impulsowej, XVIII SPETO, Ustron, 1995, ss. 117 - 122
10. Karwat T., Zdunek K., Wyniki badań wektora pola elektromagnetycznego w akceleratorze komory plazmowej uzyskane za pomocą aparatury analogowo - cyfrowej, Krajowa Konferencja Inżynierii Materialowej, Mielno, 1995
11. Karwat T., Kulas S., Zglinski K., Niektóre aspekty badania pola magnetycznego w akceleratorze generatora plazmy impulsowej, Konferencja NOTEE, Lublin, 1995, ss. 42 - 49

12. Karwat T., Kulas S., Zglinski K., Niektore aspekty jakosci energii elektrycznej dostarczanej odbiorcom wiejskim i problematyka ochrony przeciwporazeniowej, Mat. Konf. IBIMER, Warszawa, 1995, ss. 17 -20 ss. 42 - 49
13. Korytkowski J., Wincenciak S., Analiza numeryczna bezposredniego nagrzewania rezystancyjnego wsadu stalowego pradem sinusoidalnie zmiennym, XVIII-SPETO, Vol 1, ss. 269 – 276, Gliwice – Ustron, maj 1995
14. Krzeminski S., Stys J., Propagacja udarowej fali elektromagnetycznej w osrodku sprzystym, Mat. XVIII SPETO, 1995, ss. 135 - 145
15. Kwiatkowska A., Milosz M., Sikora J., Koncepcja pochodnej materialowej w projektowaniu ksztaltu: Przypadek 2D. SPETO'95, XVIII Seminarium z Podstaw Elektrotechniki i Teorii Obwodów, Gliwice-Ustron, 17-20, Maj 1995, Vol. I, pp. 219-224.
16. Majkowski A., Laboratoryjny system do analizy charakterystyk filtrów aktywnych, krokomputery w Edukacji, Zakopane, 1995r.
17. Michalski A., Wincenciak S., Przetwornik pierwotny przeplywomierza elektromagnetycznego - metoda projektowania, VIII Krajowa Konferencja METROLOGII Warszawa - Zegrze, 1995, Materialy konferencyjne, tom I str.257 - 264.
18. Mikolajuk K., Problem optymalizacji rozmieszczenia kompensatorow wyzszych harmonicznnych w sieci elektroenergetycznej, II Konferencja Elektrotechnika Pradow Niesinusoidalnych. Zielona Gora, 1-3.6.1995, str.71-76.
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3. THE BOOKS PUBLISHED IN 1994

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III. GRANTS

1. Design of the kernel of the numerical analysis of the nonstationary 3-D electromagnetic fields - prof. dr S. Bolkowski
2. New generation of rail measurement carriage - dr A. Michalski
3. Investigation of the features of the switching passive circuits by using the synthesis methods - prof. dr hab. K. Mikołajuk

4. Algorithms and methods of training of artificial feedforward neural networks in application to digital signal processing - prof. dr hab. S. Osowski
5. Distributed control and multiparameter measurement systems - dr A. Siedlecki
6. Computer measurement system for visualization of distributed magnetic fields - dr hab. S. Tumanski

IV. PHD DISSERTATIONS

1. Biernacka I., Method of adjusting the parameters of cathode protection of the earth rod, PHD dissertation, promotor prof. dr hab. J. Czajewski
2. Dabrowska I., Introductory processing of computer recognition of print characters, PHD dissertation, promotor prof. dr hab. M. Stabrowski
3. Depowska D., Method of extraction and analysis of the features of print characters for computer recognition, PHD dissertation, promotor prof. dr hab. M. Stabrowski