Summary of publications

of Assistant Professor Eng. Ginko Angelov Georgiev PhD

for the competition for the academic position of "Associate Professor" in field - 5 "Technical sciences", in the professional field - 5.2 "Electrical engineering, electronics and automation" (Electrification), announced in the State Gazette, issue 87 of 19.10.2021 on behalf of Burgas Free University (BFU).

MONOGRAPH
THE SPACE VECTOR IN THE FREQUENCY INVERTERS,
BURGAS FREE UNIVERSITY, ISBN 978-619-253-012-9.

The monograph examines the design features of AC machines in order to apply the theory of the space vector. The resulting space vector for the current in three-phase windings and different coordinate systems is analyzed. The vector control of asynchronous motors and synchronous motors with permanent magnets is described in detail, as well as the pulse width modulation as an essential element of the vector control. The results of the vector-controlled electric drives have been researched and demonstrated. The last chapter discusses the trends in the management of electrical machines.

DISSERTATION
RESEARCH OF THE POSSIBILITIES TO IMPACT ENERGY EFFICIENCY IN MARINE ELECTRICITY SYSTEMS
N. Y. VAPTSAROV NAVAL ACADEMY, VARNA, 2012.

The dissertation reviews the current state of the topic about the impact on energy efficiency in marine electricity systems. The application of generalized approaches for analysis and evaluation of electric power processes in electricity distribution networks and power electrical equipment in marine systems is justified. Transitional and established regimes of basic elements of the electrical equipment of ship systems in the presence of asymmetry and harmonics and their influence on energy efficiency have been studied. The possibilities for using specialized technical means to improve energy efficiency in marine electricity systems have also been studied. An experimental study of the load in autonomous power systems and energy efficiency management in them was conducted.

Scientific publication in publications referenced and indexed in world-famous databases of cientific information

P.32. *Ginko Georgiev, Hristian PANCHEV, Ilian ILIEV and Rumen KIROV* - **Analysis and Practical Application of the Regulatory Requirements for Coasts Power Stations in Port Complexes,** 2021, 17-th International Conference on Electrical Machines, Drives and Power Systems (ELMA), 1-4 July 2021, Sofia, Bulgaria, p 31-34

In this paper an instrumental and analytical inspection of various characteristics and indicators of a complex "coastal station - ship" was carried out in order to establish the compatibility of operation of these facilities. The analysis makes it possible to check the extent to which the regulatory requirements of international and national standards are met.

P.31. *Ginko Georgiev, Hristian PANCHEV and Rumen KIROV* - **Research on the Impact of Regulator Functions of Power Transformers on Power Losses in Electrical Supply Systems**, 2021, 17-th International Conference on Electrical Machines, Drives and Power Systems (ELMA), 1-4 July 2021, Sofia, Bulgaria p.90-93

The paper presents a study in a large industrial site to establish the possibilities for minimizing the losses of active power in the power supply system. By automatically changing the voltage of the power transformers, the generated reactive power of the synchronous motors is regulated, and with their help the optimal compensation of the reactive loads is realized. The dependence of the active power losses on the voltage and the static characteristics of the load, which is used as a criterion for efficiency, has been established.

Scientific publication in unreferred journals with peer review or in edited collective papers

P1. *Petkov P, Parushev Pl., Georgiev G.A*. **Study of processes related to electromagnetic compatibility in power supply systems of industrial enterprises**, Юбилейна научна сесия 94 - Technical University Gabrovo 1994; p. 41-49; ISSN:1313-230X

The publication presents a computer simulation model that allows for analysis and study of processes occurring in the presence of disturbances in the power supply system of the industrial enterprise caused by the operation of powerful nonlinear and electrically asymmetric loads, as well as the influence of powerful asynchronous drives. in transient mode. This model makes it possible to assess the performance of electricity consumers in the conditions of deteriorating quality indicators of electricity, taking into account the mutual influence of electricity consumers and the electrical system.

P3. *Petko D. Petkov, Plamen V. Parushev, Ginko A. Georgiev, Vladimir Ch. Chikov*, **Using a generalized approach in determining the components of apparent power in the power system**, ISSN 1311-0829, https://proceedings.tu-sofia.bg/volumes/ENik_Dnevnik_Annuaire_TUS_1995_2019.pdf

This report presents a generalized approach related to determining the components of apparent power in the conditions of asymmetry and harmonics in the power system (electric power systems), based on the theory of the space vector. The information presented in the report is a continuation and refinement of the results achieved in previous publications. The results of the research carried out with the help of a microprocessor system for measuring the quality indicators of electricity and apparent power components in the power system in the presence of "pollution" developed in accordance with the generalized approach proposed by the authors are also provided.

P4. *Petko D. Petkov, Ginko A. Georgiev, Vladimir Ch. Chikov*, **Application of the space vector to identify the parameters of induction motors**, 35 years Technical University Varna – 1997г. УДК 621.313. p.176-179

The availability of complete data on the electrical parameters of induction motors is of particular importance in the study of transient and established modes of operation of driven mechanisms and devices. The practical methods used to determine these parameters based on the passport data of the engines are approximate and introduce significant errors. Methods based on experimental determination of the electrical parameters of induction motors based on tests of idling and short circuit (locked rotor) are significantly time consuming and are usually performed in specialized laboratories. The report considers an approach to determining the parameters of induction motors, based on the theory of the space vector and the Park-Gorev equations.

P10. *Ginko Georgiev*, **Study of starting mode of powerful asynchronous electric drives**, Burgas Free University, 2013, ISBN 978-954-9370-99-7, p. 97-102

The report presents the results of a simulation study of powerful asynchronous electric drives of powerful pump units. The failures of the voltage on the supply rails in the start-up mode of asynchronous power drives comparable in power with the supply substation are estimated. Based on the analysis, a rational technical and economic solution for managing the start-up mode of this type of electric drive is proposed. The failure of the voltage at the given power ratios of the power supply and the consumers is limited and its negative impact is minimized. This is achieved through the reasonable use of softstarter starting of electric drives.

P12. *Ginko Georgiev, Kremena Dimitrova, Silvia Letskovska, Kamen Seymenliyski*, **Possibilities for solving some problems in vector control of a three-phase induction motor**, Yearbook Burgas Free University 2015, volume XXXII, p. 150-159, ISSN: 1311-221-X,

The report presented the results of proposed structural scheme subject to regulation embodying the vector principle. It has been and analytical expressions, which is based on

the conclusion of the transfer function of the system used for the model. There are also two control loop using PI regulator correction, as well as structure of the control loop with the reference model.

P13. *Ginko Georgiev*, **Possible solution for retrofit of elevator electric drive**, Burgas Free University volume 2. 12-14 June 2015, p.566-570, ISBN-13: 978-619-7126-10-5

The report presents a possible solution for retrofitting the elevator drive. The obsolete electrical equipment and the way for its modernization are described. The results of field tests after the implementation of the project are shown and the increase of the electric efficiency of the electric drive is proved.

P14. *Ginko Georgiev*, **Electricity Management of the Power Supply System of Plastic Products AD - Sredets**, Burgas Free University volume 2. 12-14 June 2015, p.571-575, ISBN-13: 978-619-7126-10-5

The report presents the results of research conducted in the power supply system of the company Plastic Products AD - Sredets. Due to the presence of non-linear loads, comparable in power with the power transformers, harmonics are generated in the power supply system of the company. The loads are imposed by the used technological equipment for the production of plastic products. This causes mainly problems related to the impossibility of compensation of the power factor, increase of electrical losses in the network and the rest of the electrical equipment of the company and others. The conducted research aims to establish in quantitative and qualitative terms the introduced disturbances from the nonlinear in relation electrical loads and the reasons for failure of the compensating capacitor device. Appropriate management measures are proposed to solve the emerging problems.

P15. *Ginko Georgiev Silvia Letskovska*, **A study of possible causes of accidents of asynchronous electric drive**, Burgas Free University20-21.09.2016 ISBN 978-619-7126-28-0, p. 513-520

This article relatedissues often failure of asynchronous motors as part of the electrical locomotive considered. There have been studies of the regime parameters in conventional and real operating conditions.

P16. *Ginko Georgiev, Silviya Letskovska, Kamen Seymenliyski and Pavlik Rahnev*, **Determination of Harmonics Level in Local Electrical Distribution System**, ICEST 2016, International Scientific Conference On Information, Communication And Energy Systems And Technologies 28 - 30 June 2016, Ohrid, Macedonia, ISBN 10 9989-786-78-X, ISBN 13 978-9989-786-78-5, EAN 9789989786785, Proceedings of Papers p. 347-351, Published by: Faculty of Technical Sciences, Bitola, Macedonia, Printing of this edition has been financially supported by EVN Macedonia

In this work the calculated results for harmonics level are presented. The results are for local electrical distribution system – the Plastic Products company in the town of Sredetz – Bulgaria. The experimental investigation is done. The goal of this determining the reason for damages and to propose variants of technical – economical decision for solving of the arising problems.

P17. *Silviya Letskovska, Kamen Seymenliyski, Ginko Georgiev,* **Laboratory Equipment for Energy Accumulation from Renewable Sources**, ICEST 2016, International Scientific Conference On Information, Communication And Energy Systems And Technologies, 28 - 30 June 2016, Ohrid, Macedonia, Proceedings of Papers p. 455-459, ISBN 10 9989-786-78-X, ISBN 13 978-9989-786-78-5, EAN 9789989786785, Published by: Faculty of Technical Sciences, Bitola, Macedonia. The printing of this edition has been financially supported by EVN Macedonia.

The goal of this work is to analyse the system for energy production using renewable energy sources. One of the main aspects is education of students. The method of work is based on production of hydrogen, accumulation and reverse transformation using photovoltaic and fuel cell

P19. *Ginko Georgiev, Kamen Seymenliyski Silvia Letskovska*, **Simulation study of the characteristics of a photovoltaic training plant in MATLAB environment,** Yearbook Burgas Free University 2017, volume XXXVI, p.165-170, ISSN: 1311-221-X,

This paper presents the result of simulating a photovoltaic central using Matlab. The obtained data show results of the parameters investigated in real conditions.

P20. *Ginko Georgiev, Kamen Seymenliyski Silvia Letskovska,* **Research of laboratory electric drive in MATLAB environment**, Yearbook Burgas Free University 2017, volume XXXVI, p.126-132, ISSN: 1311-221-X,

This paper presents the result of simulating the performance of elements of an electric drive system - an asynchronous motor and a frequency inverter using MatLab. The obtained data shows the matching of the proposed model with the actual values of the parameters of the electric drive process.

P21. *Ginko Georgiev, Silvija Letskovska, Kamen Seimenliyski and Pavlik Rahnev*, **Creating Laboratory Models for Auto Backup Power**, ICEST 2017: 52TH International Scientific Conference On Information, Communication And Energy Systems And Technologies, Niš, Serbia, June 28-30, 2017 Proceedings of Papers, p. 362-366, ISSN:2603-3259(Print), ISSN:2603-3267(Online)

This article presents the design and implementation of a laboratory model of the panel automatic start of reserve (AVR). The model manages switching switches from primary to backup power.

P22. *Silviya Letskovska, Kamen Seymenliyski, Ginko Georgiev and Pavlik Rahnev,* **Laboratory Classes for Saved Emissions of Greenhouse Gases**, ICEST 2017: 52TH International Scientific Conference On Information, Communication And Energy Systems And Technologies, Niš, Serbia, June 28-30, 2017 Proceedings of Papers, p. 366-370, ISSN:2603-3259(Print) ISSN:2603-3267(Online)

This article presents a web base teaching laboratory for the production of green energy, equipped with meteorological system. The laboratory site is created with the ability to receive and display information in real time not only to weather characteristics and generated electricity but also saved emissions of greenhouse gases

P23. *Petko Petkov, Dimitar Dimitrov, Ginko Angelov*, **On an opportunity to determine the electrical losses in induction motors in transient mode**, Yearbook Technical University Sofia, volume 68, 2018, ISSN 1311-0829, p.181-188

This publication discusses the possibility of determining electrical losses and energy in transient mode, mainly in the starting process of the motor. The time constants formed during the electromagnetic and mechanical transient process, as well as the duration of this process over time are respected. To achieve this goal, mathematical modeling of an induction motor was used in combination with the theory of the space vector. The determined electrical losses and energy are given priority in the active resistances of the stator and rotor windings of the motor.

P24. *Proykov M., G. Georgiev, Hr. Panchev, G. Ivanova, V. Giurovов*, **STUDY OF PARAMETERS AND CHARACTERISTICS IN THE EXPLOITATION OF THE ELECABLES SYSTEM OF ELKABEL INC., BURGAS** MTC-aj.com Academic journal, 2018 г., art№1725, ISSN 1312-3823, 2018

The power supply system of the site consists of GRP and 16 workshop units. with an installed capacity of over 7 MW, the main users being SM with frequency control, DC motors, fans, pumps, etc. An objective study was carried out on the energy and electricity quality indicators for two working weeks with continuous 24-hour operation of the company. The results of the studies show some deviations of some indicators from the normative ones. This provides an opportunity to improve operating modes and increase the electrical energy efficiency of the subject. An overload of the capacitor batteries with current due to the occurrence of voltage resonance has been detected. Resonant frequencies were determined at reduced and normal power transformer (PT) load. To prevent resonance phenomena, it is necessary to introduce automatic power control of the capacitor batteries by means of a regulator operating on the criterion "direction and size of the reactive power". This provides an opportunity to increase the number of compensating power steps and to perform a finer

adjustment. In addition, this approach allows adjustment of the adjustment time according to the dynamics of the load schedule. The switching processes are facilitated by the use of specialized contactors for capacitive load, shock absorbing currents, which greatly improves the efficiency of the system.

P.25 *Panchev R.K., Iliev I.H., Georgiev G.A., Chikov V.Ch.*, **ASSESSMENT AND FORECASTING OF THE RELIABILITY OF THE ELECTRIC POWER SUPPLY SYSTEMS OF INDUSTRIAL SITES IN LOWLOAD MODE**, INTERNATIONAL SCIENTIFIC CONFERENCE 16-17 November 2018, GABROVO,том 1, ISSN 1313-230X, p.32-36

An assessment has been made of the reliability of the electric power supply systems of various industrial sites operating in a low-load mode. Factors influencing the forecasting of the reliability of the electric power supply are defined. An assessment of quantitative reliability has been made using the state of the art. Based on this assessment, methods for increasing the reliability of the electric power supply systems of industrial sites operating under reduced load are marked.

P.26 *Panchev R.K., Georgiev G.A., Kirov R.M., Panchev H.I.*, **STUDY ON INFLUENCE OF THE QUALITY OF THE ELECTRICAL ENERGY ON THE RELIABILITY OF THE ELECTRICAL EQUIPMENT AND SYSTEMS,** INTERNATIONAL SCIENTIFIC CONFERENCE 16-17 November 2018, GABROVO, ISSN 1313-230X, том 1, ISSN 1313-230X, c.37-41

As a result of many years of research on real industrial sites, a probabilistic - statistical methodology estimating the influence of the quality of the electric energy on the reliability and operational resource of the power equipment and systems has been synthesized. Specific results are provided that allow the residual resource of different power elements from the electric power supply systems to be estimated. Methodological guidelines for the application of diagnostic methods for the analysis of the state of electric power supply systems are formulated.

P.27. *PROYKOV M.A., GEORGIEV G.A, PANCHEV R.K., GYUROV V.N*, **IMPACT OF ELECTRICAL SWITCHING PROCESSES AND RESONANCE PHENOMENA ON ELECTROMAGNETIC COMPATIBILITY AND RELIABILITY OF ELECTRIC POWER SUPPLY,** INTERNATIONAL SCIENTIFIC CONFERENCE "UNITECH 2018", PROCEEDINGS VOLUME I, PP.48-52, ISSN 1313-230X, GABROVO, 2018 HTTP://CEEC.FNTS.BG/DOCUMENTS/2018_UNITECH.PDF

Studies have been carried out to determine the characteristics of switching processes for switching synchronous motors and capacitor batteries. Probabilistic - statistical dependencies have been identified, which enable the possibilities for occurrence of resonant phenomena and deterioration of electromagnetic compatibility to be forecast. Applying this approach to real-

world objects makes it possible to make an effective assessment of the reliability of the electric power supply.

P28. *G. Georgiev*, **Using the capabilities of the space vectorof current to qualitatively evaluate the operation of a powerful uncontrollable rectifier,** Journal of Computer Science and Communications, Burgas Free University ISSN 1314-7846, Vol 9 № 1 (2020), p. 93-101

The report presents experimental results from real captures of the space vector of current and phase currents during operation of a bridge rectifier powered by a synchronous generator. It has been proven that the space vector is a powerful tool that can serve for rapid qualitative assessment of processes and phenomena that occur in such a power supply system.

P29. *G. Georgiev*, **Using the capabilities of the imaging vector of current and voltage to assess the asymmetry in power supply systems,** Journal of Computer Science and Communications,Burgas Free University ISSN 1314-7846, Vol 9 № 1 (2020), p. 102-108

A synchronous generator that supplies symmetrical and asymmetrical loads has been studied. Currents and voltages are monitored by a power quality analyzer. In addition, through current transformers, the three-phase system abc is converted to two-phase $\alpha\beta$ and the hodographs of the space vector of current and voltage are observed on an oscilloscope. The studies were performed for symmetrical and asymmetrical loading of the power supply system.