

**Ministry of Education and Science of Ukraine
Vinnytsia National Technical University (VNTU)
Ukrainian Association of Automatic Control
Ukrainian Federation of Informatics
Ukrainian section of the International Science and Technology Society IEEE
Lubelska Politechnika (Poland)
University Cheikh Anta Diop (Dakar, Senegal)
Universidade Nova de Lisboa (Lisbon, Portugal)
Lanzhou University of Technology (China)
Tianjin Agricultural University (China)
Kharkiv National University of Radio Electronics (KNURE)**

XV International Conference

**MEASUREMENT AND CONTROL IN COMPLEX SYSTEMS
(MCCS - 2020)**

**Vinnytsia
October 8-10, 2020**



The goal of the conference is to discuss the measurement and control problems of technical, ecological, industrial, medical and biological and other complex systems in order to find common approaches, exchange ideas, discuss trends of development in this particular scientific sphere, to establish fruitful relations and motivate talented youth to participate in scientific research. Special attention will be paid to the use of mathematical modeling, optimization, artificial intelligence and other approaches of technical sciences to solve the problems of environment protection, sustainable use of natural resources, management, medicine etc.

Conference work directions:

- **Theoretical foundations of measurement and control** (general questions of mathematical modeling and control, mathematical methods in modeling and control, modeling and control under uncertainty);
- **Perspective methods, software and hardware of measurement and control systems** (Internet of Things, methods and equipment for measurement and control in complex systems, optoelectronics and optical information processing in measurement and control systems, information encryption and transfer, telecommunications and computer networks, electronics and computing in control systems, software in control systems);
- **Measurement and control in different areas** (measurement and control in transport, ecology and mining engineering, biotechnical systems, medicine, construction, management organizational and economic systems, etc.);
- **Measurement and control in energy** (control in power supply and generation systems, in systems with renewable sources, management in power systems, etc.);
- **Intelligent technologies in control systems** (intelligent data analyzes, machine learning, optimization and decision making, pattern recognition in measurement and control systems, fuzzy methods and models in control, neural networks, genetic and other heuristic algorithms, expert systems).

SCIENTIFIC BOARD

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ORGANIZING COMMITTEE

Chairman – S. Pavlov (VNTU, vice-rector on scientific work)

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Members: O. Bisikalo, V. Kovtun, V. Kovalchuk, L. Nechepurenko, A. Vlasiuk, M. Yukhimchuk.

IMPORTANT DATES:

Application, abstract submission	September 25
Notification of paper acceptance to conference program	September 30
Paying registration fee	October 1
Opening of the conference	October 8, 10.00 am

In the case of introduction of quarantine measures, the conference may be held in teleconference mode.

Registration Fee is 400 UAH,

Distance participation (online) (with publication of papers) – 250 UAH

Distance participation (online) (with the publication of works in digital form) – 100 UAH (for foreigners in USD or EUR at rate of Ukraine National Bank)

The registration fee includes participation in conference work, equipment service, and information materials.

One should pay registration fee only after the notification concerning the acceptance to the conference program. **In case of absence at the conference the paid registration fee should not be returned.**

The participants of the conference are planned to reside in VNTU dormitories and Vinnytsia hotels (if ordered in advance and for additional payment. We will inform you further about prices).

Official languages: Ukrainian, English.

Contact Details:

Department KSU, VNTU, Khmelnytske shose, 95, Vinnytsia, 21021, Ukraine

Phone: +380 63) 857 03 23

Email: kuss2020@vntu.edu.ua

Web-site <https://conferences.vntu.edu.ua/index.php/mccs/mccs2020>

Cultural Program

For the Conference participants we plan to conduct excursions to the places of interest in Vinnytsia and Vinnytsia region. Vinnytsia is situated on the banks of the river Southern Bug and it is the center of one of the most picturesque regions of Ukraine – Podillia. Wonderful natural landscapes are ideally combined here with the urbanized civilization, which creates some unique style. The history of the city started over 6 centuries ago and during this period the city saw wars and revolutions, as well as times of rebuilding and prosperity. It is reflected in different historical monuments. Many cafes, parks, leisure centers attract residents and visitors. The city has one of the largest and most spectacular fountains in Europe.

Proceedings

The abstracts in one of the working languages of the conference will be published before the conference start.

Papers were ***reported and approved during the conference*** will be recommended for publication in the form of articles in special VNTU journals category B.

The best articles will be published in a «Proceeding of SPIE», which is indexed in SCOPUS database.

The publication will be done for a special fee – conditions of publication see on journals.vntu.edu.ua

Conference Materials Requirements:

The volume of the abstract should be one *full A4page* in MS Word for Windows (2007 or earlier) in one of the conference languages. The abstract should be submitted together with an application form. Citizens of Ukraine should also submit the reference allowing the abstract publication. Abstracts must be downloaded in the electronic registration system conferences.vntu.edu.ua/index.php/mccs/mccs2020 online. In special cases, abstracts can be sent by e-mail.

The recommended structure of abstract:

1. The formulation of the general problem (3 lines);
2. State of its solution in the world (10-12 lines)
3. Problem survey (5 lines);
4. Characteristics of the research and the obtained results;
5. Summary (5 lines);
6. References (1-3 sources).

Abstracts Formatting

Margins should be 22mm, paper size – A4. **Font:** Times New Roman Cyr, 11 pt, single-spaced.

Symbol sizes ***in formulas***: 12pt (Σ – 12pt, table – 9 pt), subscript/superscript 8pt (Σ – 11pt, table – 7pt), sub-subscript/superscript 6pt (Σ – 8pt, table – 5pt), symbol 10pt. Formulas should be centered.

Formulas should be created in Equation Editor 3.0/3.1 (internal formula editor of Microsoft Word).

Insert ***figures*** in the following way: copy a figure to clipboard, than choose “Edit”, “Special Paste”, “Picture”; figure caption should be formatted 9 pt: Fig. 1a; Fig. 2 a, b. Figures should be centered.

Material layout:

- 1) ***Authors***: skip one line, then print first names and surnames, degree and affiliation of all co-authors (12pt, bold);
- 2) print the ***report title*** in capital letters (12pt, bold) in the center of the next line; spacing before and after – 6 pt;
- 3) print ***main text*** from the new line and indent 11pt;
- 4) list of ***references***.

Registration and submission of materials is carried out in the online registration system conferences.vntu.edu.ua/index.php/mccs/mccs2020 online

ABSTRACT SAMPLE

V.M. Dubovoi, Dr. of Sc., Prof., E.D. Nikitenko, Phd, Ass. Prof.

THE PRINCIPLES OF CONTROL WITH MINIMAL ENERGY IN CONDITION OF UNCERTAINTY

The branching processes are the most difficult types of technological processes. The problem of effective management of such processes is actual because of their prevalence in various fields of industry, business process management, agriculture and etc. The peculiarity of such processes management is that at the end of any transaction of this process the decisions are made regarding transition to the next stage and selection process branch in the point of branching. Decision-making is carried out in a combined stochastic, fuzzy and interval uncertainty conditions of the process implementation [1,2]. New problems in the management of branching processes emerged by the need to save energy on all phases of management: from receiving information about process state to making and implementing decisions. Reducing uncertainty is associated with the energy spending to receive information and make decision. Problem of constructing of optimal algorithms and multi-step decision-making for reducing energy spending in condition of combined uncertainty is not enough studied which reduces efficiency of such processes.

Problems of energy saving technologies of information processing development are becoming more and more important part of a comprehensive scientific and practical direction in the world under the title «Green IT». The theme of energy saving is one of the most cited in scientific and business conferences in recent years, such as: «IT Future», «Fujitsu Siemens Computers», «Cebit». Intel, Google, Hewlett-Packard, Microsoft, Lenovo, Dell and others joined under the slogan "Slow down global warming". However, the problem of effective and energy-saving management of branching technological processes in conditions of uncertainty is new. Energy savings, and in particular energy-saving decision-making control systems would become a prerequisite for promoting technical solutions to the market in the coming years.

Objective: To improve efficiency and energy-saving characteristics of branching technological processes (BTP) management in conditions of uncertainty through the development of theories, models, methods and means of multi-step decision making and coordination in distributed systems.

The approach to problem solving involves the use of the Bellman principle and uncertain graphs as models of BTP and search for the optimal path in the graph as BTP implementation plan after each operation. The news in this approach is the decomposition of each graph node representing a state of BTP to sub-processes of control, decision-making and implementation, to evaluate the energy consumption at each stage as components of risk criteria (average losses).

The methods of multi-parametric optimization are applied when solving the problem of finding the optimal control, and one of the criteria is the energy consumption to make and implement decisions. To account different types and sources of uncertainty generalization of presentation of reliable, stochastic and fuzzy data about process characteristics was made using generalized uncertainty function β and use of this presentation for generalized risk definition as the criteria for optimal decision making:

$$R = \iiint_{\Omega_{E_m, E_d, E_c}} (E_m + E_d + E_c) \beta(E_m, E_d, E_c) dE_m dE_d dE_c,$$

where E_m, E_d, E_c - energy consumption to measure parameters of BTP state, decision making and implementation of management respectively. There is a relationship between the variables E_m, E_d, E_c :

$$E_d \uparrow \Rightarrow E_m \uparrow, E_c \downarrow$$

List of references:

1. Прийняття рішень в управлінні розгалуженими технологічними процесами : [монографія] / В. М. Дубовой, Г. Ю. Дерман, І. В. Пилипенко, М. М. Байас. — Вінниця : ВНТУ, 2013. — 223 с.
2. Efficient Resources Allocation in Technological Processes Using an Approximate Algorithm Based on Random Walk / M.M. Bayas, V.M.Dubovoy // International Journal of Engineering and Technology (IJET) Vol 5 No 5 Oct-Nov 2013 p 4214-4218