

Faculty of Engineering
University of Kragujevac



9th International Scientific Conference - IRMES 2019

Research and Development of Mechanical Elements and Systems

BOOK OF ABSTRACTS

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Department for
Mechanical Constructions and Mechanization

UNIVERSITY OF
Kragujevac



FACULTY OF ENGINEERING



DEPARTMENT OF
MECHANICAL
CONSTRUCTIONS AND
MECHANIZATION



9TH INTERNATIONAL SCIENTIFIC CONFERENCE - IRMES 2019

RESEARCH AND DEVELOPMENT OF MECHANICAL ELEMENTS AND
SYSTEMS

BOOK OF ABSTRACTS

Editor: Nenad Marjanović

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FOREWORD

The 9th International Scientific Conference - IRMES 2019 - Research and Development of Mechanical Elements and Systems is organized by the Department for Mechanical Constructions and Mechanization of the Faculty of Engineering at the University of Kragujevac and the Association for Design, Elements and Constructions – ADEKO.

On the previous eight IRMES Conferences (the first in 1995, the last in 2017), around a thousand papers have been presented, and there were over a thousand participants from all over the world. A long and successful tradition is a stable basis for organizing this and future IRMES Conferences.

The mission of IRMES Conferences is to serve the global community by improving, spreading and applying new engineering knowledge, with the goal of being used as a source of the newest and most relevant information for mechanical engineers and experts in related fields – on a local, regional and global level.

Specific goals, themes and fields of the IRMES 2019 Conference are defined in cooperation with the ADEKO association, and in accordance with current topics and problems. Thematic units of the conference are: Mechanical Elements and Systems (modeling and simulation, loading and stress conditions, tribology, noise and vibrations, maintenance and monitoring, safety, quality, reliability), Power and Motion Transmission Systems (development of new concepts, modeling and simulations, noise and vibrations, testing, safety, quality, reliability), Product Development Process (technology transfer, creativity and innovations, development and design, Innovative product development, smart systems, industry 4.0, knowledge economy) and New Technologies and Materials (CAD/ CAM/ CAE technology, intelligent production systems, robotics and mechatronics, rapid prototyping, new materials).

We have ensured a wide international participation, in order to have as many high quality research papers as possible and in order to increase the significance and influence of IRMES Conferences on a global level. Of a total of over 180 submitted papers, authors of over 60% of the papers are from over 30 different foreign countries.

All submitted papers have undergone the process of international review, and of the submitted papers 140 were accepted which met the high set criteria. We would like to thank the reviewers on their hard work and dedication, which have increased the quality of the IRMES 2019 Conference.

This Book of Abstracts features extended abstracts of those papers, while the complete papers will be, according to authors' preferences be published through IOP Publishing Service in "IOP Conference Series: Materials Science and Engineering", or in one of six eminent journals.

Keynote lectures for the IRMES 2019 Conference will be held by prominent professors: Marco Ceccarelli - President of IFToMM, professor of Mechanics of Machines at the University of Rome Tor Vergata, Italy, Radoslav Martinović - retired professor at the University of Montenegro, Vojislav Miltenović - Chief of the Smart office 1 of the Innovation Center of the University in Nis (ICUN), and Milosav Ognjanović - professor emeritus at the University of Belgrade, Faculty of Mechanical Engineering. He is a full member of Academy for Engineering Sciences of Serbia – AESS and works for EDePro – Engine Design and Production.

Included in the IRMES 2019 Conference is also the Honorary Committee, which is made up of the most respected and experienced professors and researchers from the field of machine elements and design, with the goal of achieving continuity and a high quality of IRMES conferences to come.

Using good experiences from the previous IRMES 2017 conference, a student section will be organized again this year. Our goal is to spark interest in, and include, a large number of students, young and creative people, to work in the field of elements and design and to suggest new ideas and specific solutions, and to, through their participation in the conference, gain new experiences.

A large support for the organization of the Conference was provided by our sponsors. Aside from material help, it is important that a large number of companies understands and supports the importance of research and connecting results to practical application. We would like to thank our sponsors on their support.

The IRMES 2019 Conference will also include a number of other manifestations in order to ensure a high quality of exchanging knowledge and experiences, as well as a pleasant stay in Kragujevac in September of 2019.

We would like to thank all authors, committee members, reviewers, sponsors and others who have helped this Conference and attributed to its quality and importance.

To all participants we wish successful involvement in the IRMES 2019 Conference and a pleasant stay in Kragujevac.

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The IRMES Programme Committee is a constant body which decides on important matters for future IRMES conferences, such as: the organizer, time and place of conferences, themes, etc. The committee is made up of representatives from ADEKO member institutions and organizers of previous IRMES conferences.

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The honorary committee for IRMES 2019 is made up of members which have through their work and/or authority contributed to the development of machine elements and systems, as well as creating and maintaining IRMES conferences. Honorary committee members are from the ranks of distinguished academic citizens and experts specializing in relevant fields to the conference theme. The idea behind forming the Honorary committee as a permanent IRMES conference body is to show much deserved respect and appreciation to deserving researchers, and to have them actively and formally be included in the organization and workings of IRMES conferences.

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RESEARCH OF WATER HYDRAULIC COMPONENTS AND SYSTEMS FROM ASPECTS OF QUALITY OF LIFE

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Modern water hydraulics is a unique field of science in which mathematical methods of describing processes and phenomena are in line with the results of experimental tests. The theory is confirmed and supplemented with experiments in order to create the basis for more exact and reliable research.

The most important component of the water hydraulic system is the pump. The modern development of water hydraulic pumps sets the standards in terms of the ever more stringent modes of operation of the pumps, and in terms of their quality and reliability. Special attention is paid to raising the level of technical performance through, improving the overall efficiency and energy savings, reducing the noise level as an important ecological factor, increasing the age of the devices in exploitation, correct structuring of the whole system in which the device works, optimization of the operating mode and management.

Axial Piston pump is one of the most frequently used hydraulic components in recent engineering technique (Figure 1).

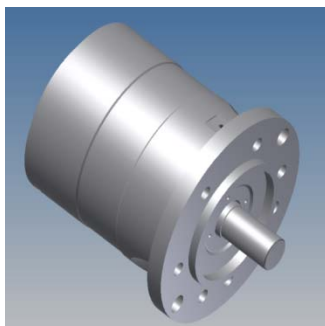


Figure 1. Axial piston pump of water hydraulic

The research and development challenges were to find engineering solutions to the specific problems in design and manufacturing of water hydraulic components and industrial systems suitable for using pure tap water as the pressure fluid. Current technological efforts for water hydraulics are far less than those for oil hydraulics. The experience gained from oil hydraulics is very important for future water hydraulics research.

Experimental research of piston axial pumps of water hydraulics carried out in the Research and Development Center RDC-PPT NAMENSKA. The tests were carried out on a test facility specially formulated for the examination of water hydraulic components. The basic component of the test installation is the test stand BAC 2063 (Figure 2).



Figure 2. Test stand BAC 2063

Energy efficiency of components and systems will be also very important aspect in the future. The consumption of energy during system use have to be minimized. The life cycle of the whole systems have to be considered. The situation at water hydraulic is different. Due the material requirements of components, the system building costs are higher than oil hydraulics at present. The use of water instead of oil is offering benefits, when considering energy consumption. The experiences of experimental research will provide good helps for design and development of water hydraulic axial piston pumps. Modern water hydraulic technology is still new and a lot of problems must be solved to make the technique more widely vailable for power transmission.

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