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V International Scientific-Technical Conference

Book of abstracts

ACTUAL PROBLEMS OF RENEWABLE ENERGY, CONSTRUCTION AND ENVIRONMENTAL ENGINEERING

The time and place of the meeting: 3 – 5 June 2021
Faculty of Environmental, Geomatic and Energy Engineering,
Kielce University of Technology, Poland
al. Tysiąclecia Państwa Polskiego 7, 25-314 Kielce

Conference Chairs:

Anatoliy Pavlenko
prof. doctor of science Department of Building Physics
and Renewable Energy, Kielce University of Technology

Aleksander Szkarowski
prof. doctor of science Head of Department of Construction
Networks and Systems, Koszalin University of Technology

KIELCE 2021

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The organizers:

- Kielce University of Technology, Faculty of Environmental, Geomatic and Energy Engineering (Poland)
- Koszalin University of Technology, Faculty of Civil Engineering, Environment and Geodetic Sciences (Poland)
- Ivano-Frankivsk National Technical University of Oil and Gas (Ukraine)
- The European Academy of Education and Science (Ukraine - Poland)
- KTH Royal Institute of Technology, Department of Chemical Engineering (Sweden)
- University of Zagreb, Faculty of Metallurgy (Croatia)
- National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine)
- University of Žilina, Department of Power Engineering (Slovakia)
- Saint Petersburg State University of Architecture and Civil Engineering (Russia)
- Kazan State Power Engineering University (Russia)

Scientific and organizing committee of the conference:**Co-organizers (Scientific committee):**

- Prof. doctor of science ANATOLIY PAVLENKO – Department of Building Physics and Renewable Energy, Kielce University of Technology (Poland)
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The general program of the Conference	Time	Place	Moderator
Registration of participants	3 June 2021 10:00-10:45		The Organizing Committee
This opening session, plenary session	4 June 2021 11:00-12:00		Prof. doctor of science Anatoliy Pavlenko Prof. doctor of science Aleksander Szkarowski Prof. doctor of science Engvall Klas Prof. doctor of science Yevstakhii Kryzhanivskiy Prof. doctor of science Borys Basok Prof. doctor of science Ladislav Lazić Prof. doctor of science Milan Malcho Prof. doctor of science Valerii Deshko
Actual problems of building physics	4 June 2021 12:30-14:00		Prof. doctor of science Valerii Deshko
Actual problems of environmental engineering and ecology	4 June 2021 12:30-14:00		Prof. doctor of science Hanna Koshlak Prof. doctor of science Vera Ulyasheva
Actual problems of thermal and renewable energy	4 June 2021 12:30-14:00		Prof. doctor of science Anatoliy Pavlenko
Actual problems of fundamental heat and mass transfer	4 June 2021 12:30-14:00		Prof. doctor of science Ladislav Lazić Prof. doctor of science Lukasz Orman
Theoretical foundations of thermal machines	4 June 2021 12:30-14:00		Prof. doctor of science Borys Basok Prof. doctor of science Milan Malcho
Actual problems of quantitative assessment of the low-carbon energy and industry	4 June 2021 12:30-14:00		Prof. doctor of science Malik Ziganshin Prof. doctor of science Aleksander Szkarowski
Continued work of section	5 June 2021 12:30-14:00		The section moderators
Discussion	5 June 2021 14:15-15:30		The section moderators
Summary and the closing of the conference,	5 June 2021 16:00		The Organizing Committee



Anatoliy Pavlenko - professor of Kielce University of Technology, Department of Building Physics and Renewable Energy. Scientific direction of work - thermophysics of dispersed media. Scientific interest - mathematical modeling of thermophysical processes occurring in liquids in the metastable state.

Dear Colleagues,

I cordially greet all participants of our 5th international conference.

For five years now our Conference traditionally consolidates all those best scientific ideas, that authors present in their speeches.

All these years we examine the questions and problems of modern power engineering, energy technology of power-consuming industry branches, alternative sources of energy, resource conservation, questions of modeling the process of industrial equipment, processes and equipment of various branches of industry, questions of automated control systems and information processing, heat-and mass-exchanging processes and equipment of special technique, questions and problems of electricity and power control.

I see these directions also in the submitted works this year.

Unfortunately, the restrictions associated with the coronavirus did not allow us to traditionally meet for discussion. I think that next year we will be able to do this at our university.

I wish everyone good health and new creative achievements.

Conference Chairs

Anatoliy Pavlenko



Aleksander Szkarowski – profesor dr hab. inż., Kierownik Katedry Sieci I Instalacji Budowlanych Politechniki Koszalińskiej. Zainteresowania naukowe i kierunki badań – poprawa sprawności i ekologiczności spalania paliwa w energetyce i przemyśle oraz efektywności wykorzystania energii w ciepłownictwie, ogrzewnictwie i wentylacji.

Drodzy Koledzy i Przyjaciele – Uczestnicy naszej Konferencji!

Po raz piąty spotykamy się, żeby w towarzyskiej atmosferze a także i ostrych dyskusjach wymieniać zdania na temat wyników badań, pomysłów i wynalazków, które szanowni Autorzy przedstawią w swoich referatach. Nie każda konferencja pochwalić się może wysokim poziomem naukowym w tak obszernym zakresie tematów.

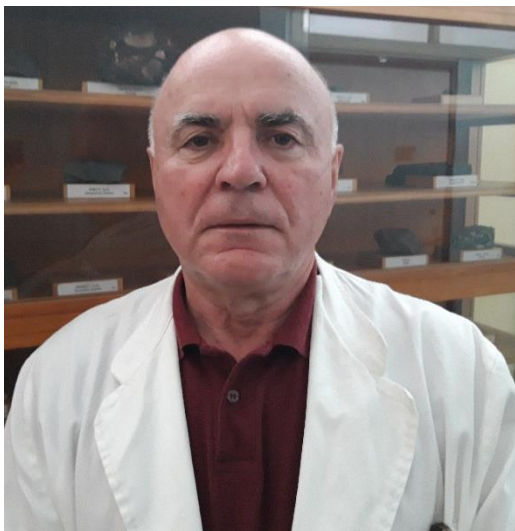
Dowiadujemy się o nowych badaniach związanych z procesami i urządzeniami różnych gałęzi przemysłu, zagadnieniami zautomatyzowanych systemów sterowania i przetwarzania informacji, procesami wymiany ciepła i masy oraz urządzeniami specjalistycznej techniki, jak również zagadnieniami i problemami regulacji energii i mocy elektrycznej.

Nie zabraknie tych ważnych tematów także w naszych spotkaniach.

Życzę wszystkim Uczestnikom dobrego zdrowia i humoru oraz nowych osiągnięć twórczych.

Współprzewodniczący Konferencji

Aleksander Szkarowski



Ladislav Lazić - professor of University of Zagreb, Faculty of Metallurgy, Department of Mechanical Metallurgy, Laboratory of Thermal Technique and Mechanical Engineering. The main areas of scientific activities: Computation of high-temperature radiative heat transfer, Thermodynamics of fuel utilization and pollutant formation, Design and efficiency of industrial furnaces and heating equipments, CFD approach to combustion modelling and numerical simulation of furnace processes, Finite element technique in simultaneous transient conduction and thermal stress analysis, Techniques in the reduction of NOx emissions and, in particular, Metallurgical archeology.

Dear colleagues, organizers and participants of the 5th Conference,

it is my great pleasure to be a member of the Scientific and organizing committee of the conference for several reasons. The main reason is that in today's world, energy and ecology are in the focus of interest, and I am glad that the organizers of the conference are institutions of countries with whose scientific and educational institutions I have many years of successful cooperation. I regret that due to the Coronavirus Pandemic we will not have the opportunity for personal contact, but we remain in the hope that we will realize this next year.

I greet you from my city of Petrinja, where I live, and from Sisak, where I work, cities that were badly damaged in two strong earthquakes in December last year. However, that did not destroy our hope for recovery.

I wish you all the best in business and personal life,

Ladislav

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NUMERICAL MODELING OF SOLID AND GASEOUS FUEL COMBUSTION IN THE TP-14A BOILER FURNACE TO REDUCE PCDD / F AND GREENHOUSE GAS EMISSIONS INTO THE ATMOSPHERE

Elizaveta Zheltukhina^{1*}, Malik Ziganshin²

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Department of Thermal Power Plants, Russia*

The issues related to the emission of atmospheric pollutants during the provision of energy supply services and the circulation of household waste in settlements are considered. The ways of air pollution by toxic compounds and the formation of greenhouse gases with existing methods of waste heat treatment are analyzed. The issues of reducing the content of toxic emissions in combustion products are studied on the basis of a numerical experiment by means of computational fluid dynamics (CFD). The combustion processes in the power boiler TP-14A (E 220/100) are considered and adequate boundary conditions for the processes of aerodynamics, heat transfer and combustion of gas fuel are determined. The temperature, velocity and concentration fields in the furnace of the investigated boiler have been determined. According to the results of the calculations performed, the formation of chemical underburning and nitrogen oxides is predicted.

Urban air pollution is a major risk factor for public health. The negative impact on the state of atmospheric air is the result of the constant interaction of people with the environment. A wide variety of sources contributes to the loss of air quality. These are transport, energy, industry and the entire complex of housing and communal services - residential complexes and consumer services for the population, down to the smallest. It is believed that from stationary sources objects of large energy and municipal infrastructure (sewage treatment plants and MSW landfills) of the given settlement make the largest contribution to urban air pollution. The main pollutants in terms of mass emission (excluding greenhouse gases) are sulfur dioxide SO₂, nitrogen oxides NO_x and carbon monoxide CO. They account for up to 80%, the share of other homogeneous pollutants is less than 10%, the rest is solid suspended particles.