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ECE 2018

MATECWoC-17
3rd Scientific Conference on Environmental
Challenges in Civil Engineering
APRIL 23-25, 2018, OPOLE, POLAND

ORGANIZATORZY / ORGANIZERS



Polish Association of Civil
Engineers and
Technicians, Opole Branch



Opole District Chamber of
Civil Engineers

Commission of Civil engineering
Katowice Branch
Polish Academy of Sciences

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PREFACE

The 3rd Scientific Conference on Environmental Challenges in Civil Engineering (ECCE 2018) was held on 23-25 April 2018 in Opole and organized by the Faculty of Civil Engineering and Architecture of the Opole University of Technology, Polish Association of Civil Engineers and Technicians – Opole Branch, Opole District Chamber of Civil Engineers, with the support of the Commission of Civil Engineering, Katowice Branch of the Polish Academy of Sciences.

The Conference was a continuation of conferences previously organized in 2014 and 2016 on the same issues. ECCE Conference 2018 took place in a special period for the Faculty of Civil Engineering and Architecture of the Opole University of Technology. This year, the Faculty celebrates the 50th anniversary of its existence. Thus, the ECCE 2018 conference was a part of the rich program of celebrating this jubilee.

139 papers from 16 national research centers and 11 foreign ones from the Czech Republic, Germany, Greece, Italy, Malaysia, Norway, Russian Federation, Slovakia, Thailand, Ukraine and USA were submitted to the organizing committee. The selected and reviewed works were divided into 4 thematic groups:

- I. Sustainable civil engineering, impact on environment, durability and protection of buildings and structures, energy consumption in civil engineering, unconventional energy sources;
- II. Material engineering, waste management in civil engineering;
- III. Design of buildings, including reconstruction and renovation of historic buildings;
- IV. Innovative construction technologies and exploitation of buildings and structures (including industrial, hydrotechnical, communal, transportation and geotechnical), BIM in civil engineering, legal and organizational issues of preparation and implementation of construction projects.

Finally, after positive reviews, 98 papers were accepted for the Conference, of which 42 was delivered during the conference at one plenary session and eight thematic sessions. The remaining 56 papers were presented at the poster session.

The main aim of the ECCE2018 conference was to exchange views and experiences of the scientific staff and the civil engineers in the area of environmental conditions of the designing, implementation and maintenance of buildings and structures. The conference was also an opportunity to exchange views among scientists from the country, abroad and engineers – practitioners on the latest research and solutions in civil engineering.

As part of the conference, a technical trip took place to see the construction site of power units no. 5 and 6 of the Opole Power Plant (one of the biggest construction investments in Europe). It was an opportunity to compare technological and material achievements used in practice in relation to currently conducted research in Poland and abroad.

The scientific papers presented at the ECCE 2018 Conference contained the results of interdisciplinary scientific research in the field of construction, engineering and environmental protection and can be used by the scientific community for further research and analysis. Whereas, by engineers – practitioners involved in the designing of buildings and structures, they can be used to implement the latest techniques and technologies in construction industry and activities related to the reduction of energy consumption in construction industry, while maintaining the principles of sustainable development.

We also hope that, the Conference will contribute to the deepening of international cooperation between domestic and foreign centers in the field of research, joint projects, networking and exchange of experience.

EDITORS OF THE CONFERENCE PROCEEDINGS



Adam Rak, PhD, D.Sc., Associate Professor, Head of Department, Department of Civil Engineering and Construction Processes Faculty of Civil Engineering and Architecture, Opole University of Technology, Poland. E-mail: a.rak@po.opole.pl. Research activities focus on conducting researches on the application of modern mathematical methods in the modeling of technological processes in environmental engineering and construction, construction of numerical models to optimize the procedures of supervision and control of investment processes, analysis of the issues of engineering and environmental protection in construction,

environmental conditions of preparation and the implementation of investment and the problems of processes that shape the quality of surface and underground waters. The author or co-author of more than 100 studies, concepts, designs and expertise in the field of water and sewage management, agricultural waste management and environmental impact assessment. The current scientific achievements include 185 publications and studies. 44 of these works have been published, including: 2 books, editing of 4 multi-authorial monographs, 31 original works. Some of the works were published in English in scientific journals: Polish Journal of Environmental Studies, International Journal of Engineering Research and Application, International Journal of Water Sciences, Open Journal of Architectural Design, Water Supply - Water Practice and Technology, Wulfenia Journal, and as chapters in monographs: Cutting Edge Research in New Technologies and Environmental Engineering III - Taylor & Francis Group.



Damian BEBEN, Ph.D., D.Sc., Associate Professor. He works at the Faculty of Civil Engineering and Architecture, Opole University of Technology, Poland. E-mail: d.beben@po.opole.pl. An author and co-author of 3 books and over 150 publications on the national and international conferences as well as in the peer-reviewed scientific journals indexed in the Journal Citation Reports. He has a Hirsh Index of 8, according to the Web of Science Core Collection. He is a reviewer in many scientific international journals and the National Centre for Research and Development. Member of the International Association for Bridge Maintenance and Safety (IABMAS); International Association for Life-Cycle Civil Engineering (IALCCE); International Association of Computer

Science and Information Technology (IACSIT); Transportation Research Board (TRB) of the National Academies, Committee on Subsurface Soil-Structure Interaction (AFS40). He was the scholarship holders of the Foundation of Polish Science for the young prominent scientists; scientific scholarship for outstanding young scientists awarded by the Ministry of Science and Higher Education; 2011 Outstanding Reviewer for the Journal of Bridge Engineering (ASCE); and the European Social Found for Ph.D. Research interests: analysis of soil-steel bridge, durability of engineering structures, field load tests of structures, non-destructive evaluation of structures, environmental protection in transportation engineering.



Zbigniew PERKOWSKI, Ph.D., D.Sc., Associate Professor. E-mail: z.perkowski@po.opole.pl. He has been working since 1999 at the Faculty of Civil Engineering and Architecture of Opole University of Technology (Poland) where he is currently the head of the Mechanics of Materials Team in the Materials Physics Department. He is an author and co-author of 3 books, and over 60 publications including proceedings of the national and international conferences as well as articles in the peer-reviewed scientific journals. He is a member of two sections of the Committee of Civil Engineering and Hydroengineering of the Polish Academy of Sciences – Section of Building Physics and Section of Mechanics of Structures and Materials, and a chairman of the Commission of Civil Engineering at Katowice Branch of Polish Academy of Sciences in the term of office 2015-2018. In 2013, he received the Professor W. Żenczykowski's Award of Polish Association of Civil Engineers and Technicians (PACET) for the achievements in research in the field of Civil Engineering. Research interests: damage mechanics, mechanics of concrete, composite structures, building physics, ultrasonic testing of concrete structures.

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