

Preface

This volume contains a collection of carefully selected, peer-reviewed papers presented at the Advanced Computer System 2016 (ACS 2016) Conference organized by the Faculty of Computer Science and Information Technology, West Pomeranian University of Technology in Szczecin, Poland, in cooperation with the Faculty of Mathematics and Information Science, Warsaw University of Technology, Faculty of Physics and Applied Computer Science, AGH University of Science and Technology in Cracow, Poland, the Institute of Computer Science, Polish Academy of Sciences in Warsaw, Poland, and—last but not least—Ehime University in Matsuyama, Japan.

The ACS 2016 is a very special event because it is the twentieth one of this conference series. Since the first ACS 1994, which has just been a relatively small event organized by a small group of enthusiasts who have noticed that various issues related to broadly perceived advanced computer systems have become one of the major challenges faced by both science and technology. Over the years we have been able to clearly see that the very concept of an *advanced computer system* has been changing, in some cases more rapidly, in some cases quite slowly. However, the organizers have always showed an ingenious ability to find topics which have become attractive and challenging, and then gather so many people from all over the world. This has implied a considerable growth of the ACS Conference, in the sense of a growing number of participants, coming from increasingly many countries, but also in the sense of a growing number of co-organizers because more and more top academic and research institutions have highly appreciated the great job done by the Faculty of Computer Science and Information Technology West Pomeranian University of Technology in Szczecin, Poland, which has initiated the ACS conference series, and has been the main organizer since the very beginning. The involvement of foreign academic and research institutions, notably the Ehime University of Matsuyama, Japan, has also been a major factor in the internationalization of this conference series.

This volume is an account of the contributions submitted to the ACS 2016. The papers have been peer reviewed and the authors have introduced valuable suggestions and remarks of the reviewers. The volume is divided into parts which

correspond to the main lines of the conference. For the convenience of the readers, we will now briefly summarize the contents of the papers accepted.

Part I, *Artificial Intelligence*, is concerned with some basic conceptual, theoretic and applied issues of artificial intelligence, as well as computational intelligence, that constitute a foundation of virtually all tools and techniques covered by the topics of the Conference.

In their paper, *On fuzzy RDM-arithmetic*, A. Piegat and M. Landowski present a novel concept of a horizontal membership function (HMF, for short), and its related fuzzy relative distance measure (fuzzy RDM) based arithmetic. Then, they compare it with the standard fuzzy arithmetic (SF arithmetic). The fuzzy RDM-arithmetic possesses many important and strong mathematical properties which, as opposed to the SF-arithmetic that delivers, in general, approximate, partial fuzzy solutions, makes it possible to obtain complete fuzzy solution sets. The authors explain how to implement the RDM-arithmetic and show some applications.

M. Pietras (*Hidden Markov Models with affix based observation in the field of syntactic analysis*) introduces some new Hidden Markov Models (HMMs) with N-gram observation based on words bound morphemes (affixes) used in natural language text, with a focus on syntactic classification. The curtailment of the consecutive gram's affixes presented, decreases the accuracy in observation, but reveals statistically significant dependencies so that a considerably smaller size of the training data set is required. Then, an impact of affix observation on the knowledge generalization and an improved word mapping are also discussed. The main issue is the evaluation of the HMMs in the field of syntactic analysis for English and Polish languages based on the Penn and Sładnica treebanks. In total, 10 HMMs differing in the structure of observation are compared, and advantages of the approach and the particular structures are presented.

In *Opinion acquisition: an experiment on numeric, linguistic and color coded rating scale comparison* by O. Pilipczuk and G. Cariowa, the authors present the problem of acquiring an opinion of a person using different rating scales. A particular attention is given to the scale devised using a visible color spectrum and to the selection of the optimum number of colors in the scale. A comparison of the effectiveness of the color-coded scale, word scale and some selected numerical scales is performed in the process of student's opinion acquisition with the opinions collected by questionnaire and interviews. The authors compare the average time of giving answers and the cognitive load (mental effort), and describe some important problems occurring in the question answering process. They show that the opinion is the most difficult to acquire using the word scale, while the results are the easiest using the color scale and the -10 to $+10$ numerical scale.

W. Rogoza and M. Zabłocki (*A weather forecasting system using intelligent BDI multiagent-based group method of data handling*) propose the concept of analysis of complex processes based on a multiagent platform is presented. The analysis, rooted in the Group Method of Data Handling (GMDH) is employed to construct a model of the process analyzed. The model is used to predict the future development of the process. The author employs a multiagent platform composed of BDI agents

which provides an intelligent distributed computational environment. Moreover, different evaluation criteria are considered, and examples of applications are shown.

In *Comparison of RDM Complex Interval Arithmetic and Rectangular Complex Arithmetic*, M. Landowski presents a comparison of the RDM complex interval arithmetic with the rectangular complex arithmetic. The RDM complex interval arithmetic is multidimensional and this property gives a possibility to find full solutions of problems with complex interval variables. To show the application of the RDM complex interval arithmetic, some examples with complex variables are solved using both the RDM and rectangular complex interval arithmetics.

In *Homogeneous Ensemble Selection - Experimental Studies*, R. Burduk and P. Heda present a new dynamic ensemble selection method. The method proposed uses information from the so-called decision profiles which are formed from the outputs of the base classifiers. In order to verify the algorithms, a number of experiments have been carried out on several publicly available benchmark data sets. The proposed dynamic ensemble selection is experimentally compared against all base classifiers and the ensemble classifiers based on the sum and decision profiles based methods. As base classifiers, the authors use a pool of homogeneous classifiers.

W. Rogoza (*Deterministic method for the prediction of time series*) considers the problem that is important to virtually all business analysts who are frequently forced to make decisions using data on a certain business process obtained within a short time interval. Under these conditions the analyst is not in a position to use traditional statistical methods and should be satisfied with just a few experimental samples. The paper deals with the new method for the prediction of time series based on system identification. The new method proposed shows flexibility and accuracy when the analyzed process is regular in a sense, and it is useful for the prediction of time series in a short-term perspective.

L. Chmielewski, A. Orłowski and M. Janowicz (*A Study on Directionality in the Ulam Square with the Use of the Hough Transform*) use a version of the Hough transform in which the direction of the line is represented by a pair of co-prime numbers for the investigation of the directional properties of the Ulam spiral. The method reveals the detailed information on the intensities of the lines which can be found in the square and on the numbers of primes contained in these lines. This makes it possible to make quantitative assessments related to the lines. The analysis, among others, confirms the fact that is well known from observations that one of the diagonal directions is more populated with lines than the other one. The results are compared to those obtained for a square containing randomly located points with a density close to that for the Ulam square of a corresponding size. Besides its randomness, such a square has also a directional structure resulting from the square shape of the pixel lattice. This structure does not depend significantly on the size of the square. The analysis reveals that the directional structure of the Ulam square is both quantitatively and qualitatively different from that of a random square. A larger density of lines in the Ulam square along one of the diagonal directions in comparison to the other one is confirmed.

Part II *Design of Information and Security Systems* deals with various aspects and approaches to the formulation, analysis and solution of a crucial and challenging issue of information systems in general and security systems in particular.

N. Borgest and M. Korovin (*Ontological approach towards semantic data filtering in the interface design applied to the interface design and dialogue creation for the 'Robot-aircraft designer' informational system*) discuss an approach to data compression in the *robot-airplane designer* system which is a system for an automated airplane design. The proposed approach is tested on a prototype of a demo of the *robot-airplane designer* system which is capable of solving the task within a given amount of time, with some presentation limitations. The importance of providing the user with just enough information to help him or her make a correct decision, without a data and information overload is emphasized. The solution proposed is based on an ontological approach in which the required bits of information are extracted from a knowledge base with regard to the user's level of competence and personal preferences. The project data, including statistical information, design decision-making strategies and values for the target values are stored in a number of databases, interconnected using a thesaurus.

G. Śmigielski, R. Dygdała, H. Zarzycki and D. Lewandowski (*Real-time system of delivering water-capsule for firefighting*) consider the method of explosive-produced water aerosol, delivered by a helicopter to a location near a fire area and then released and detonated, as an alternative and efficient technique of large-scale fire extinguishment. The effectiveness and efficiency of this technique depends on quality of the control system—its determinism, speed of computation of the moment of capsule's release and reliability of components. The article presents a proposed solution to the design of such system, with design assumptions, selection of the integration step size in numerical method, structure of the real-time system and a practical verification of the system.

K. Yamaguchi, T. Inamoto, K. Endo, Y. Higami, and S. Kobayashi (*Evaluation of Influence Exerted by a Malicious Group's Various Aims in the External Grid*) are concerned with some aspects related to the grid computing systems. Basically, though the external grid realizes high performance computing, it is necessary to guarantee the robustness of its functioning against malicious behaviors of the computers. Though in the literature a technique to protect program codes against such behaviors has been proposed, only one type of malicious behavior has been considered to evaluate the effectiveness and efficiency of the approach proposed though in reality malicious behaviors may vary according to the purpose of malicious groups. The goal of this paper is to present a new approach to guarantee the safety of the external grid in a quantitative way, and the authors evaluate the effectiveness of concealing processes against several types of malicious behaviors.

In *Subject-specific methodology in the frequency scanning phase of SSVEP-based BCI* by I. Rejer and Ł. Cieszyński, the authors are concerned with some issues related to the Steady State Visual Evoked Potentials (SSVEPs) often used in Brain Computer Interfaces (BCIs). Since they may differ across subjects, the authors propose a new SSVEP-based BCI in which the user should always start the session with the frequency-scanning phase. During this phase, the stimulation

frequencies evoking the most prominent SSVEPs are determined. It is proposed that not only the stimulation frequencies specific for the given user should be chosen in the scanning phase but also the methodology used for the SSVEP detection. The paper reports the results of a survey aimed at finding whether using subject specific methodology for identifying stimulation frequencies would increase the number of frequencies found. Three factors are analyzed: the length of time window used for the power spectrum calculation, a combination of channels, and the number of harmonics used for the SSVEP detection. The experiment (performed with 6 subjects) shows the mean drop in the number of SSVEPs detected with any other but the best combination of factors to be very large for all subjects (from 31.52 % for subject S3 to 51.76 % for subject S4).

A. Grocholewska-Czuryło (*S-boxes cryptographic properties from a statistical angle*) presents the design of a new, strong S-box to be incorporated as the non-linear element of the PP-2 block cipher designed recently at the Poznan University of Technology. A statistical analysis of the cryptographic criteria characterizing a group of S-boxes generated by inverse mapping with random search elements is presented. The statistical tests used in this research are not pure randomness checks but are also related to the most important real cryptographic criteria like the non-linearity, SAC and collision avoidance.

In *Wavelet transform in detection of the subject specific frequencies for SSVEP-based BCI* by I. Rejer, the author considers one of the paradigms often used to build a brain computer interface (BCI), namely the paradigm based on steady state visually evoked potentials (SSVEPs). In a SSVEP-based BCI the user is stimulated with a set of light sources flickering with different frequencies. In order to ensure the best performance of the BCI built according to this paradigm, the stimulation frequencies should be chosen individually for each user. Usually, during the frequency-scanning phase the user-specific stimulation frequencies are chosen according to the power of the corresponding SSVEPs. However, not only the power should be taken into account while choosing the stimulation frequencies, and the second very important factor is the time needed to develop the SSVEP. The wavelet transform (WT) seems to be an excellent tool for dealing with this task since it provides not only information about the frequency components represented in the signal but also about the time of the occurrence. A procedure, based on WT, is proposed that can be used to determine the user-specific frequencies with respect to the synchronization time and its strength.

T. Klasa and I. El Fray (*Data scheme conversion proposal for information security monitoring systems*) are concerned with the information security monitoring in a highly distributed environment which requires the gathering and processing of data describing the state of its components. For a proper interpretation, these data should be acquired in a proper form, and numerous meta languages and description schemes are available, but usually only one or few of them is supported by a given data source. A set of those schemes supported by a given device or program is defined by its manufacturer, and due to the utilization of proprietary formats, usually it is impossible to apply a single scheme to all data sources. As a consequence, it is necessary to apply a data conversion scheme, transforming

various incompatible messages to a chosen data scheme, supported by the main repository and the analytic subsystem. Only then it is possible to process data to determine the current state of security of the whole information system. The issues mentioned above and considered and some new solutions are proposed.

In *Non-Standard Certification Models for Pairing Based Cryptography* by T. Hyla and J. Pejaś, the authors are concerned with some important issues related to certification. Namely, in the traditional Public Key Infrastructure (PKI), a Certificate Authority (CA) issues a digitally signed explicit certificate binding a user's identity and a public key to achieve this goal. The main purpose of introducing an identity-based cryptosystem and certificateless cryptosystem is to avoid high costs of the management of certificates. In turn, the goal of introducing an implicit certificate-based cryptosystem is to solve the certificate revocation problem. The certificate and pairing based cryptography is a new technology and so far it mainly exists in theory and is just being tested in practice. This is in contrast to the PKI-based cryptography which has been an established and is widespread technology. New types of cryptographic schemes require new non-standard certification models supporting different methods of public keys' management, including their generation, certification, distribution and revocation. In this paper the authors take a closer look at the most prominent and widely known non-standard certification models, and discuss their most relevant properties and related issues. Also, they survey and classify the existing non-standard certification models proposed for digital signature schemes that use bilinear pairings. The authors discuss and compare them with respect to some relevant criteria.

Part III, *Multimedia Systems*, contains original contributions dealing with many aspects of broadly perceived multimedia.

A. Cariow and G. Cariowa (*An algorithm for the Vandermonde matrix-vector multiplication with reduced multiplicative complexity*) present a new algorithm for computing the Vandermonde matrix-vector product. Its main ideas boil down to the use of Winograd's formula for the inner product computation. The multiplicative complexity of the proposed algorithm is less than that of the textbook (naïve) method of calculation. If the textbook method requires MN multiplications and $M(N-1)$ additions, the proposed algorithm needs only $M+N(M+1)/2$ multiplications at the cost of extra additions compared to the naïve method. From the point of view of its hardware implementation on the VLSI chip, when the implementation cost of the multiplier is significantly greater than the implementation cost of the adder, the new algorithm is generally more efficient than the naïve algorithm. When the order of the Vandermonde matrix is relatively small, this algorithm will have a smaller multiplicative complexity than some well-known fast algorithm for the same task.

J. Peksiński, G. Mikolajczak and J. Kowalski (*The use of the objective digital image quality assessment criterion indication to create panoramic photographs*) present a new method for creating panoramic photographs. The method uses their own matching which is based on the analysis of the indication of a popular digital image assessment quality measure, the Universal Quality Index. The result of

applying the suggested algorithm is an effective and efficient match of the sequence of partial digital photographs which make the panoramic photograph.

In *Human Face Detection in Thermal Images Using an Ensemble of Cascading Classifiers* by P. Forczmański, the problem of thermal imagery in the context of face detection is dealt. The purpose is to propose and investigate a set of cascading classifiers learned on thermal facial portraits. In order to attain this, an own database is employed which consists of images from an IR thermal camera. The classifiers employed are based on the AdaBoost learning method with three types of low-level descriptors, namely the Haar like features, the histogram of oriented gradients, and the local binary patterns. Results of experiments on images taken in controlled and uncontrolled conditions are promising.

R. Mantiuk (*Accuracy of high-end and self-built eye-tracking systems*) is concerned with eye tracking which is a promising technology for human–computer interactions though rather rarely used in practical applications. The author argues that the main drawback of the contemporary eye trackers is their limited accuracy. However, there is no standard way of specifying this accuracy which leads to underestimating the accuracy error by eye tracker manufacturers. In this work a subjective perceptual experiment is performed of measuring the accuracy of two typical eye trackers: a commercial corneal reaction-based device mounted under a display and a head-mounted do-it-yourself device of the author’s own construction. During the experiment, various conditions are taken into consideration including the viewing angle, human traits, visual fatigue, etc. The results indicate that the eye tracker accuracy is observer-dependent and measured gaze directions exhibit a large variance. Interestingly enough, the perceptually measured accuracy of the low-cost do-it-yourself device is close to the accuracy of the professional device.

R. Staniucha and A. Wojciechowski (*Mouth features extraction for emotion analysis*) deal with the analysis of face emotions which is one of the fundamental techniques that might be exploited in a natural human–computer interaction process and thus is one of the most studied topics in the current computer vision literature. In consequence, the extraction of face features is an indispensable element of the face emotion analysis as it influences a decision-making performance. The paper concentrates on extraction of the mouth features which, next to the eye region features, become one of the most representative face regions in the context of emotion retrieval. In the paper an original gradient-based mouth feature extraction method is presented. Its high performance (exceeding 90 % for selected features) is also verified for a subset of the Yale images database.

D. Oszutowska-Mazurek and P. Mazurek (*Sensitivity of Area-Perimeter Relation for Image Analysis and Image Segmentation Purposes*) are concerned with the image analysis with the use of fractal estimators which is important for the description of grayscale images. The sensitivity of the Area Perimeter Relation (APR) using the Brodatz texture database and the Monte Carlo approach is analyzed in this paper. The APR curve obtained APR is approximated using a polynomial and two parameters of the polynomial are applied as the discrimination parameters. A few techniques for the evaluation of APR are applied. The results show the possibility of the discrimination using a single or two polynomial

parameters even for a few textures. The quality of the discrimination (separation between texture classes) can be improved if a larger window analysis sizes is applied.

In *Vocal tract resonance analysis using LTAS in the context of the singer's level of advancement* by E. Półrolniczak and M. Kramarczyk, the authors present results of signal analysis of the recorded singing voice samples. The performed analysis is focused on the presence of resonances in the singing voices. The LTAS (Long-Term Average Spectrum) is estimated over the vocal samples, and then analyzed to extract the valuable information to conclude about the quality of the singer's voices. The study is part of a broader research on singing voice signal analysis. The results may contribute to the development of diagnostics tools for the computer analysis of singer's and speaker's voices.

J. Bobulski (*Parallel Facial recognition System Based on 2D HMM*) dealt with some important issues related to facial recognition. With the constantly growing amount of digital data, in virtually all applications, applying increasingly efficient systems for processing them is required quite often and an increase of the performance of individual processors has already reached its upper limit, multiprocessor systems are a necessity. To fully take advantage of the potentials of such systems, it is necessary to use parallel computing. The system for face recognition requires high-computational power, which is one of potential applications of the computations parallelization, especially for large databases. The purpose of this paper is to develop a parallel system of face recognition based on two-dimensional hidden Markov models (2D HMMs). The obtained results show that compared to sequential calculations, the best effects are obtained for the parallelization of tasks, and the acceleration for the training mode is by the factor of 3.3 and for test mode is 2.8.

M. Kubanek, Filip Depta and D. Smorawa (*System of Acoustic Assistance in Spatial Orientation for the Blind*) develop a prototype of an electronic device which navigates a blind person by means of sound signals. Sounds are meant to provide the blind with a simplified map of the object depth in their path. What makes the work innovative is the use of the Kinect sensor applied to scan the space in front of the user as well as the set of algorithms designed to learn and generate the acoustic space which also take into account the tilt of the head. The results of experiments indicate that a correct interpretation of the sound signals is obtained. The tests conducted on the people prove that the concept developed is highly effective and efficient.

Part IV, *Software Technologies*, contains very relevant contributions which show some effective and efficient software solutions that can be used for the implementation of virtually all kinds of novel algorithms and systems proposed in the papers included in this volume.

A. Luntovskyy (*Performance and Energy Efficiency in Distributed Computing*) discusses some performance-to-energy models and tradeoffs in distributed computing exemplified by clusters, grids and clouds. The performance models are examined. A very relevant problem of energy optimization is considered for the data centers. It is advocated that a better tradeoff of *performance-to-energy* can be

reached using advanced *green* technologies as well as in the so-called Internet of Things (IoT) environment.

O. Koval, L. Globa and R. Novogrudska (*The Approach to Web Services Composition*) present an approach to the composition of Web services based on their meta descriptions. The process of Web services sequence formation is depicted. Such sequences of Web services describe the execution of certain user's task. The method of user's tasks scenario formation is proposed that allows to dynamically define an ordered sequence of Web services required to run a specific user's tasks. The scenario formation for the real user's task 'Calculation of the strength for the power components of magnetic systems' is represented, showing the applicability and efficiency of new approach proposed.

W. Bielecki and M. Palkowski (*Loop Nest Tiling for Image Processing and Communication Applications*) dealt with the loop nest tiling which is one of the most important loop nest optimization techniques. They present a practical framework for an automatic tiling of affine loop nests to reduce time of application execution which is crucial for the quality of image processing and communication systems. The new framework is derived via a combination of the Polyhedral and Iteration Space Slicing models and uses the transitive closure of loop nest dependence graphs. To describe and implement the approach in the source-to-source TRACO compiler, loop dependences are presented in the form of tuple relations. The applicability of the framework to generate tiled code for image analysis, encoding and communication program loop nests from the UTDSP Benchmark Suite is shown. Experimental results demonstrate the speed-up of optimized tiled programs generated by means of the approach implemented in TRACO.

W. Bielecki and P. Skotnicki (*Tile Merging Technique to Generate Valid Tiled Code by Means of the Transitive Closure*) present a novel approach for the generation of a parallel tiled code of arbitrarily nested loops whose original inter-tile dependence graphs contain cycles. The authors demonstrate that the problem of cyclic dependences can be reduced to the problem of finding strongly connected components of an inter-tile dependence graph, and then solved by merging tiles within each component. The technique proposed is derived via a combination of the Polyhedral Model and Iteration Space Slicing frameworks. The effectiveness and efficiency of the generated code is verified by means of well-known linear algebra kernels from the PolyBench benchmark suite.

In *Performance Evaluation of Impact of State Machine Transformation and Run-Time Library on a C# Application* by A. Derezińska and M. Szczykowski, the authors discuss some issues related to the Model-Driven Development (MDD) of software applications, notably the. UML models which are transformed into code and combined with a run-time library, the mapping of state machine concepts, including concurrent behavior issues, which can be realized in various ways. The authors discuss several problems of call and time event processing and their impact of an application performance. In experiments, different solutions were evaluated and quantitatively compared. They are applied in the refactoring of FXU—a framework for C# code generation and application development based on UML classes and state machine models.

L. Fabisiak (*The method of evaluating the usability of the website based on logs and user preferences*) discusses the development of usability assessment services based on data from the internal structure of the websites. The author considers the problem of evaluating the usability of the websites on the basis of: selecting appropriate criteria, determine their significance, selection decision support methods and users preferences. The website user preferences are assumed to be variable in time and are usually different from those included in the requirements when the site is designed and launched. Once created the website may lose its usability due to variable needs of its users. The aging of services, developments in software and hardware in computer science, technological and life style changes, change of trends and fashion, varying conditions related to the users' behavior, etc., can imply a need for a new analysis and development of new methods to evaluate the usability of websites. The author shows the analysis of the usability of websites based on the data contained in the logs and accounting for changing user preferences based on the history of the use of services.

A. Konys (*Ontology-Based Approaches to Big Data Analytics*) discusses some important issues related to a new reality which basically boils down to the fact that the access to relevant information is obviously one of the determining factors which directly influences the quality of decision-making processes. However, since huge amounts of data have been accumulated in a large variety of sources in many different formats, this makes the use of data difficult. The Web of Data is considered to provide great opportunities for ontology-based services. The combination of ontology-based approaches and Big Data may help solve some problems related to the extraction of meaningful information from various sources. This paper presents a critical analysis of some selected ontology-based approaches to Big Data analytics as well as the proposal of a new procedure for ontology-based knowledge discovery.

Many people deserve our thanks. First of all, we wish to cordially thank the authors and participants because without their hard work to prepare such good papers, the conference would have not been successful and would have not attracted such a big audience from all over the world. In this context, special thanks are also due to the reviewers who have done an excellent job and whose extremely valuable remarks and suggestions have greatly improved the scientific excellence of papers.

Since, as we have already mention the ACS 2016 is already the twentieth conference in this series, with the first Advanced Computer System conference (at that time known as conference on Applications of Computer Systems) held during December 16–17, 1994, in Szczecin, Poland, we wish to thank many people who have made an invaluable contribution. First of all, special appreciation and thanks are due to Professor Jerzy Soldek who has initiated the conference series and has been since the very beginning in 1994 encouraging and supporting the organizers of the subsequent events which has been a key factor in the conference success.

It has been a tradition since the first conference that the organizers have always invited top specialists in the fields, and many top scientists and scholars have presented plenary talks over the years which have always provide much inspiration for future research and for both young and experienced participants. To mention a few, thanks are due to Profs. Anna Bartkowiak (Poland), Liming Chen (France),

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In keeping with ACS mission over last 20 years, this twentieth anniversary conference, ACS 2016, is a very special event providing comprehensive state-of-the-art summaries from keynote speakers as well as a look forward towards future research priorities. Thanks are due to the this year invited speakers, Professors Anna Bartkowiak from the University of Wrocław (Poland), Gisella Facchinetti from the University of Salento (Italy), Jerzy August Gawinecki from the Military University of Technology (Poland), Larisa Globa from the National Technical University of Ukraine (Ukraine), Akira Imada from Brest State Technical University (Belarus), Khalid Saeed from Białystok University of Technology and Warsaw University of Technology (Poland), Arkadiusz Orłowski from Warsaw University of Life Sciences SGGW (Poland), and Jacek Pomykała from the University of Warsaw (Poland).

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The Editors

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