

## **ICEMP 2018**

**2018 The 7th International Conference  
on Engineering Mathematics and Physics**

## **ICNSAM 2018**

**2018 The 3rd International Conference  
on Natural Science and Applied Mathematics**

*June 15-18, 2018*

*Prague, Czech Republic*

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# FRONT PAGE

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Mathematics and Physics (ICEMP 2018)



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# AGENDA

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[June 16, 2018]  
MORNING





Masaryk Dormitory of Czech Technical University in Prague



Room Gallery @ Ground floor @ Masarykova kolej-ČVUT

## Speeches

**Chaired by** Prof. Rodica Luca Tudorache,  
"Gheorghe Asachi" Technical University of Iasi, Romania

09:00-09:10	<b>[Opening Remarks]</b> by Prof. Rodica Luca Tudorache, "Gheorghe Asachi" Technical University of Iasi, Romania
09:10-09:50	<b>Keynote Speech</b> [Complex partial differential equations – a unified approach] By Emeriti Prof. Heinrich Begehr, Free University Berlin, Germany
09:50-10:20	 <b>Coffee Break &amp; Group Photo</b> 
10:20-11:00	<b>Keynote Speech</b> [Promise theory, a tool for system specification] Prof. Jan Bergstra, Minstroom Research BV, Utrecht, The Netherlands
11:00-11:30	<b>Invited Speech</b> [Positive Solutions for Riemann-Liouville Fractional Boundary Value Problems] Prof. Rodica Luca Tudorache, "Gheorghe Asachi" Technical University of Iasi, Romania
11:30-12:00	<b>Invited Speech</b> [Pattern recognition analysis to explore molecular sequence] Prof. Bimal Kumar Sarkar, Galgotias University, India



**Lunch @ Atrium**  
<12:00-13:30>

# AGENDA

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[June 16, 2018]  
AFTERNOON

Room Gallery @ Ground floor @ Masarykova kolej-ČVUT	
13:30-15:30 	<b>Session I - Mathematical theory and calculation</b> Chaired by Prof. Rodica Luca Tudorache "Gheorghe Asachi" Technical University of Iasi, Romania
	<b>6 Presentations</b> —AM013, MP3003, MP3004, AM103, AM020, AM027
15:30-15:50	<b>Coffee Break</b>
15:50-18:10 	<b>Session III - Bioinformatics and Environmental Science</b> Chaired by Dr. Nannapasorn Inyim, Ramkhamhaeng University, Thailand
	<b>7 Presentations</b> —MP3002, AM015, AM022, AM023, MP010, AM010, AM011

Classroom I @ Ground floor @ Masarykova kolej-ČVUT	
13:30-15:30 	<b>Session II –Mechanical Engineering and Business Management</b> Chaired by Prof. Eugene Machusky, Technical University of Ukraine "Kyiv Politechnic Institute", Ukraine
	<b>6 Presentations</b> —MP001, MP019, MP021, MP3001, MP016, AM025
15:30-15:50	<b>Coffee Break</b>
15:50-18:10 	<b>Session IV - Applied Physics</b> Chaired by Prof. Bimal Kumar Sarkar, Galgotias University, India
	<b>7 Presentations</b> —MP004, MP007, MP020, AM104, MP3005, AM021, MP022



**Dinner @ Atrium | <18:10-20:00>**

# VENUE

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 Address: **Masaryk Dormitory of Czech Technical University in Prague**

## Mass transport



**Metro** - Trace A station Dejvická



**Tram** - 20, 36, night 51 - stations Dejvická or Vítězné náměstí



**Bus** - 119 - station Nádraží Veveslavín, Night BUS-routes 510-station Vítězné náměstí

# SPEAKERS

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**Emeriti Prof. Heinrich Begehr,  
Free University Berlin, Germany**

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Heinrich Begehr was born on April 17, 1939. He received the M.S. degree and Ph.D degree in Mathematics from Free University Berlin, Germany in the year of 1966 and 1968 respectively.

Dr. Heinrich Begehr joined Institute of Mathematics at Free University Berlin in 1970 as an associate professor, and then retired in 2004 as a professor. He has also been the director of Institute of Mathematics at Free University Berlin from 1972 to 1973, 1974-80, 1982-83, 1986, 1990-1999, 2001-2004.

Dr. Heinrich Begehr served as an editor for Berliner Studienreihe zur Mathematik since 2004, and for Series on Analysis, Applications and Computation since 2005. Also in editorial board of many international journals including Complex Variables, Elliptic Equations, Monograph and Surveys in Pure and Applied Mathematics, and Research Notes in Math, International Society of Analysis, its Applications and Computation, General Mathematics, Journal of Applied Functional Analysis, Journal of Analysis and Applications, International Journal of Mathematics and Mathematical Sciences (IJMMS), Advances in Pure and Applied Mathematics, Applied Mathematics and Mathematical Physics, International Journal of Mathematics and Applications (IJMA), etc.

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**Title---**Complex partial differential equations – a unified approach

**Abstract---**Within the past two centuries complex analysis has developed a variety of deep theories with enormous influence as well in pure as in applied mathematics. These are the results on analytic, on generalized or pseudo analytic, on meta analytic, on bi-analytic and poly-analytic, on harmonic and poly-harmonic functions, on quasi-conformal mappings, and their higher dimensional generalizations in quaternionic and Clifford analysis, self-conjugate differential forms, quasi-regular mappings. All these theories can be viewed as results for solutions to complex partial differential equations, linked to mathematicians as Cauchy, Riemann, Bers, Carleman, Vekua, Beltrami, Laplace, Poisson, Bitsadze. Even the theory of analytic functions of several complex variables arose in the attempt to get some more insight in the theory of partial differential equations.

Although all the theories developed are much more than just collections of properties of solutions to certain complex partial differential equations it is worthwhile to found a unified approach to complex partial differential equations including all the mentioned equations.

The only tools needed are a hierarchy of complex partial differential operators, and the main theorem of calculus in the form of the Gauss divergence theorem in complex form. Fundamental solutions serve to find potentials to certain model equations which can be used to transform more general differential equations into singular integral equations. To them the Fredholm alternative can be applied guaranteeing solvability under proper conditions.

The talk will concentrate on the model equations and their integral representations related to boundary value problems.

# SPEAKERS

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**Prof. Jan Bergstra**

**Minstroom Research BV, Utrecht, The Netherlands**

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Jan Bergstra is a Dutch logician currently active as an independent researcher and consultant working within Minstroom Research BV, Utrecht, The Netherlands.

His work has focussed on logical aspects of theoretical informatics, more specifically: term rewriting, process algebra, abstract data types, instruction sequences, proposition algebra, theory of meadows, and informational money.

Born in 1951 in Rotterdam, he obtained a PhD in mathematical logic at Utrecht University in 1976. Subsequently he worked for Leiden University, the CWI in Amsterdam, Philips Research, Utrecht University, and from 1985 till 2016 as a professor of software engineering at the University of Amsterdam. He is a member of AE (Academia Europaea) and of the KNAW (Royal Netherlands Academy of Arts and Sciences). He is Editor in Chief of 'Science of Computer Programming'. Since 2008 Jan Bergstra has been cooperating with Mark Burgess from Oslo in the setting of Mark Burgess' approach to promise theory, primarily working towards applications within informatics. Recently the focus of their research on promises has been extended to the role of promises in politics and the use of promises in the conceptualisation of money.

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**Title**---Promise theory, a tool for system specification

**Abstract**---Promise theory has been proposed by Mark Burgess (Oslo) as a tool for system specification, in particular protocol aspects of interactive systems.

I will survey the basic assumptions of promise theory and I will outline a structured notation for promises, which

allows to take a flexible number of features into account. By taking different collections of features into account promises can be specified at different levels of abstraction. Promises can be classified in various ways: how promises come about: structural promises, operational promises, implicit promises, and explicit promises, and which actors are involved: types one, two and three.

A pure and principled approach to promises views facts as promises rather than conversely. Promise theory may be useful for application in social sciences as well as in technology. To that end I will outline an extension of promise theory with a notion of threat. Threats have a somewhat different logic than promises. Finally the relation between threat and risk is discussed.



# SPEAKERS

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Prof. Rodica Luca Tudorache

"Gheorghe Asachi" Technical University of Iasi, Romania

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Rodica Luca Tudorache is professor of Mathematics at the "Gheorghe Asachi" Technical University of Iasi, Romania. She obtained her Dr. Habil. degree in Mathematics from School of Advanced Studies of the Romanian Academy - Simion Stoilow Institute of Mathematics of the Romanian Academy from Bucuresti (2017), and her Ph.D. degree in Mathematics from "Alexandru Ioan Cuza" University of Iasi (1996). Her research interests are boundary value problems for nonlinear systems of ordinary differential equations, finite difference equations, and fractional differential equations, and initial-boundary value problems for nonlinear hyperbolic systems of partial differential equations.

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**Title**---POSITIVE SOLUTIONS FOR RIEMANN-LIOUVILLE FRACTIONAL BOUNDARY VALUE PROBLEMS

**Abstract**---We study some nonlinear Riemann-Liouville fractional differential equations, and systems of fractional differential equations with parameters or without parameters, subject to multi-point boundary conditions which contain fractional derivatives. Under sufficient conditions on the nonlinearities of the equations and the systems, which can be nonsingular or singular functions, we prove the existence, nonexistence and multiplicity of positive solutions of these problems, by using the Guo-Krasnosel'skii fixed point theorem, the Banach contraction mapping principle, the Krasnosel'skii fixed point theorem for the sum of two operators and the fixed point index theory (see [1-4]).

This talk is based on the results of some joint works with J. Henderson (Baylor University, Waco, Texas, USA).

References:

1. J. Henderson, R. Luca, Boundary Value Problems for Systems of Differential, Difference and Fractional Equations. Positive Solutions, Elsevier, Amsterdam, 2016.
2. J. Henderson, R. Luca, Existence of positive solutions for a singular fractional boundary value problem, Nonlinear Analysis: Modelling and Control, 22 (1) (2017), 99-114.
3. J. Henderson, R. Luca, Existence of nonnegative solutions for a fractional integro-differential equation, Results in Mathematics, 72 (2017), 747-763.
4. R. Luca, Positive solutions for a system of Riemann-Liouville fractional differential equations with multi-point fractional boundary conditions, Boundary Value Problems, 2017 (102) (2017), 1-35.

# SPEAKERS

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Prof. Bimal Kumar Sarkar  
Galgotias University, India

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Dr. Bimal Kumar Sarkar, born January 2, 1961, in Kolkata, India, graduated in physics at Jadavpur University and electrical engineering at Institute of Engineers (India). He did his Ph.D. on the topic Photoacoustic Spectroscopic Estimation of Thermal and Optical Properties of Solids at Indian Association for the Cultivation of Science, India. He pursued a postdoctoral fellowship at the Department of Chemistry, National Sun Yat-sen University, Taiwan. Afterward he visited in research positions at NSYSU, Taiwan, Czech Technical University, Slovak Technical University etc.

Now he is a Professor in Physics at Galgotias University, India with activity in research and teaching. At present, he is involved in the field of Computational Materials and Computational Biology. His research interest is ab initio study of the structural, lattice dynamics, electronic, elastic, thermodynamic, optical properties of solids. First-principles calculations based on density functional theory (DFT) are performed to study the structural and electronic properties of solids. Also he is doing computational work based on information theory for the investigation of network architecture of genome controlled signal transduction circuit. In March 2013 he had 80 articles published in international peer reviewed journals and conference proceedings.

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**Title---**Pattern recognition analysis to explore molecular sequence

**Abstract---**Pattern recognition analysis (PRA) is a mathematical technique to explore the relations between two related views of the same semantic object. The analysis focuses on the correlation between a linear combination of the variables in one set and another linear combination of the variables in the other set. PRA determines the linear combinations of  $x$  and  $y$ , called canonical variables, in such a way that the correlation between the canonical variables becomes utmost among all such linear combinations. We have used canonical correlation algorithm in pattern recognition in molecular sequence identify specific site in the DNA. As infected a human lymphoid cell line with HIV-1-based vector and obtained 524 chimeric sites we examine the applicability of PRA. Based on dynamic window sliding along the sequence the symmetrical word is sought with two halved combination of window. Statistically significant relations are found between sequence-driven features, which suggest that the viral preference must be the factor responsible for this correlation.

Keyword: Pattern recognition, canonical correlation, DNA sequence, HIV.

# SESSIONS

**June 16th, 2018**

## **Session III**

[Bioinformatics and Environmental Science]

**🕒 15:50-18:10**

**📍 Room Gallery @ Ground floor**

Chaired by Dr. Nannapasorn Inyim

Ramkhamhaeng University, Thailand

**7 presentations—**

MP3002, AM015, AM022, AM023, MP010, AM010, AM011

**\*Note:**

Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.

Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.

One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded when the session is over.

# SESSIONS

	Simulation of such dependent parameters may help to understand monsoon variability and may be applicable to tropical regions.
AM022 16:30-16:50	<p>Reconnaissance Study on Saltwater Intrusion Control at Main Raw Water Pumping Station of Metropolitan Waterworks Authority (Thailand)  <b>Lerdlekha Sriratana</b> and Krisda Bisalyaputra            Ramkhamhaeng University, Thailand</p> <p>Abstract— At present, saltwater intrusion in water resource is highly concerned as it could severely affect various sectors such as water utilization, irrigation as well as water supply production process. This study aims to assess the problem of saltwater intrusion in raw water resource of Metropolitan Waterworks Authority (Thailand). In addition, a conceptual framework to handle this crisis was developed based on literature review and revised by the experts for applicability and sustainability of the proposed framework. From study, it can be noted that saltwater intrusion in this case could be effectively controlled by integrating several methods such as water diversion, fresh water discharge, barrage with sluice gates, submerged weir/rubber dam, Abstraction Desalination and Recharge (ADR), and Cutoff wall. Moreover, water resource management should be well considered and applied to overcome such problem.</p>
AM023 16:50-17:10	<p>A Study on Dry Leaf Composting in Reused Small-Size Bottle  <b>Nannapasorn Inyim</b>            Faculty of Engineering, Ramkhamhaeng University, Bangkok, Thailand</p> <p>Abstract— Daily falling tree leaves generate a large number of dry leaves that requires a proper management. Among traditional waste disposal methods, composting is considered more sustainable and eco-friendly for handling the leaf waste. The final product of the process is an organic fertilizer (compost) which is very useful to apply for soil amendment. However, the composting of dry leaves has difficulties because a degradation of the material is a time-consuming process. This paper proposed a way to increase the rate of dry leaf degradation in a composting process. A survey of literature to investigate major factors affecting composting process and experiments on dry leaf composting in a small-size reactor made of discarded water bottles were conducted. Operational conditions in the experiments were based on the most recommended values including the C/N ratio of 25, the moisture of 60%, and the particle size of 3.35-20 mm. From experimental results, the co-composting of dry leaves and vegetable waste under the above conditions resulted in 31.2% reduction of organic matter within three weeks. The final product of the co-composting contained a C/N ratio of 14.3 indicating the maturity of the obtained compost. It was found that the initial ratio of C/N in composting material played a key role among other factors. This was evidently indicated by comparing degradation rates in terms of organic matter reduction between the composting of dry leaves with the C/N ratio adjustment and that without the C/N adjustment. The reduction of organic matter in the first case was nearly twofold that of the second one within the same period.</p>