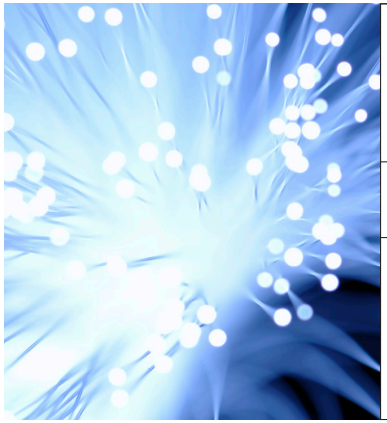
The INTERNATIONAL CONFERENCE on
APPLIED MATHEMATICS,
MODELING and COMPUTATIONAL SCIENCE



AMMCS2013

Interdisciplinary AMMCS Conference Series

AUGUST 26–30

WATERLOO, ONTARIO, CANADA

Mathematics and Computation
Partial Differential and Int
Applications of Dynamical S
Computational Physics and C
Computational Algebra, Comb
Mathematical Models in Social
Computational Mechanics and Eng
Financial Mathematics and Computati
Statistical Modeling in Envrionmental Sciences
Computational Methods for Hyperbolic Problems
Applied Problems and Methods in Research and Education

CONFERENCE PROGRAM

Program Chair
Monica Gabriela Cojocaru

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Registration:

The AMMCS-2013 registration desk is located in the 1st floor of the Bricker Academic building. It will be staffed at the following times:

Sunday, August 25	**15:00 - 18:00 and 19:00 - 21:00 (Science Courtyard)**
Monday, August 26	**7:30 - 11:30 and 13:30 - 16:00**
Tuesday August 27	**8:30 - 10:30 and 13:30 - 15:30**
Wednesday, August 28	**8:30 - 10:30**
Thursday, August 29	**8:30 - 10:30 and 13:30 - 15:30**
Friday, August 30	**8:30 - 10:30**

1 Acknowledgements

Organizing Committee

Monica G. Cojocaru	(Conference Program Chair, Guelph)
Manuele Santoprete	(Student Prize Committee Chair, Wilfrid Laurier University)
Hasan Shodiev	(Local Organizing Committee Chair, Wilfrid Laurier University)
Robert Jerrard	(Global Organizing Committee, UofT)
Herb Kunze	(Global Organizing Committee, U of Guelph)
Roman Makarov	(Conference Treasurer)
Brian West	(Conference Program Chair - until April 2013)
Ilias Kotsireas	(General Co-chair)
Roderick Melnik	(General Co-chair, SIAM Representative)

Technical Support Committee

Cameron Davidson-Pilon	(Web Coordinator)
Dalibor D. Dvorski	(Electronic Publishing Coordinator)
Jeanette Haas	(Administrative Support)
Sanjay Prabhakar	(Computer Support)
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Anatoli Ivanov (Pennsylvania State University)
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Tamas Terlaky (Lehigh University)
Konstantinos E. Parsopoulos (University of Ioannina)
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Student Volunteers Team

Richard Douglas
Ayesha Banerjee
Sherry Cheng,
Nguyen Hoang
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Cressanne Lang
Saqif Abdullah
Mary Huang
Andrei Malinovski
Sylvia Nguyen
Monika Roerig
Stephen Tully
Jingyu Ma
Safia Athar
Jasmine Clement
Rakesh Dhote
Harold Hodgins
Nida Khan
Damaris McKinley
Anisha Mahant
Rania Masood
Nynke Prins
Limeng Shi
Chi Zhang
Erin Meger

2 Conference Events

Welcoming Reception

Sunday, August 25 - 19:00 - 21:00 Science Courtyard
Join your fellow AMMCS-2013 attendees for an informal get-together with food and drinks.
The welcoming reception is included as part of your registration fees; a conference registration table will be set up at the event.
(See Section 10 for directions)

Conference Banquet

Thursday, August 29 - 19:00 - 22:00 St. George Hall, 665 King St. N, Waterloo - www.stgeorgehall.com
After-dinner speech by **Peter Carr**, *Morgan Stanley, New York, USA*.
Those of you who have already purchased banquet tickets will receive them upon check-in. For others, $50 tickets will be sold at the registration desk until 15:30 on Tuesday, August 27.
For those requiring transportation, a bus will be provided.
(See Section 10 for directions)

Student Prize Competition and Young Researcher Awards

Friday, August 30, 18:00 - 18:15 BA101
At the conclusion of the conference, the winners of the AMMCS-2013 Student Prize Competition will be announced. Three separate competitions will be held for undergraduate and graduate students:

1.Best AMMCS-2013 Poster. To be eligible, the student must be a co-author of the work presented and a designer of the poster. This competition may include a short discussion with a judging panel, related to the content of the poster. The poster presentations are scheduled for Thursday, August 29.

2. Best AMMCS-2013 Student Paper in a Special Session. To be eligible, the student must be a co-author of the work and present it during one of the Special Sessions or Minisymposia.

3. Best AMMCS-2013 Student Paper in a Contributed Session. To be eligible, the student must be a co-author of the work and present it during one of the Contributed Sessions.

The AMMCS-2013 Kolmogorov-Wiener Prize for Young Researchers will also be awarded. The competition for this award is open to young researchers in the category of recent PhD graduates and postdoctoral fellows under the age of 35.

3 Information for Visitors

Wireless Networking

AMMCS-2013 is pleased to provide free wireless internet service on the Wilfrid Laurier University campus. For connection information and to obtain a password, please go to the registration desk.

Computer Terminals

Rooms BA206 and BA207 contain computers that are available for use by AMMCS-2013 attendees. In particular, you may use these rooms to check your email or edit your presentations (on PowerPoint). For login information, please go to the registration desk.

Parking

AMMCS-2013 attendees may purchase parking passes for $7 per day. These can be purchased (using cash only) from 8:00 to 16:00 at the parking kiosk, which is located at the main entrance to the campus, off of University Ave. They can also be purchased at the AMMCS-2013 registration desk on Monday and Tuesday. Finally, there are two Pay and Display lots. These also cost $7 per day, payable by cash or credit card. Parking permits allow you to park in the white permit lots only. Parking is free on weekends and after 16:30 on weekdays.

Public Transit

Wilfrid Laurier University is serviced by routes 7, 8, 12, 29, 200, and 201 on University Ave. West and King St. North. Route maps are available at the registration desk or at www.grt.ca. For a taxi, call 519-888-7777.

AMMCS-2013 thanks the following sponsors and cooperating organizations for their generous support:

4 Welcoming Remarks

Welcome to AMMCS-2013

On behalf of the Organizing, Scientific and Technical Committees of the International Conference on Applied Mathematics, Mathematical Modeling and Computational Science, we would like to welcome you to the conference held from August 26 through 30, 2013 on the Waterloo Campus of the Wilfrid Laurier University, Canada.

The previous conference in this Interdisciplinary AMMCS Conference Series took place two years ago in the year of the 100th anniversary of Wilfrid Laurier University. The AMMCS-2011 was a satellite meeting of the International Congress on Industrial and Applied Mathematics held on Canadian soil for the first time.

This year the AMMCS conference has an even more exciting scientific program featuring over 50 special and contributed sessions in several parallel tracks, 11 one-hour talks given by distinguished scientists and mathematicians, as well as 8 semi-plenary speakers. Each day of the conference, the scientific program starts with a plenary session that features one of the conference plenary speakers. The scientific program of the conference provides a unique opportunity for in-depth technical discussions and exchange of ideas in applied mathematics, computational science and mathematical modeling with their applications in natural and social sciences, engineering and technology, industry and finance.

We are proud that the conference is again held this year on the campus of Wilfrid Laurier University. It is the oldest university in the Cambridge-Kitchener-Waterloo-Guelph area, a beautiful part of Southwestern Ontario located in a comfortable driving distance from some of North America's major tourist destinations, including the Niagara Escarpment, a UNESCO World Biosphere Reserve, Toronto and Niagara Falls.

On behalf of the Organizing, Scientific and Technical Committees, we would like to thank all people involved in this event. In particular we would like to express our sincere thanks to special session organizers, to all the authors who submitted valuable results forming the basis of conference, and to our sponsors. Thanks to all for your hard work to ensure a dynamic, enjoyable and professionally fulfilling conference. We also hope that you will enjoy this beautiful part of the world and will take home with you an intellectually inspiring and socially satisfying experience.

Roderick Melnik, Ilias Kotsireas

Conference Co-Chairs,

5 Plenary Speakers

Plenary Speaker Wednesday, Aug 28, 15:15–16:15 **Room BA 201**
Peter Carr *Managing Director Morgan Stanley*
Models, Mathematics, and Markets - Is the Intersection an Empy Set?

Dr. Peter Carr is a Managing Director at Morgan Stanley with over 15 years of experience in the financial industry. He is currently the Global Head of Market Modeling, overseeing several quantitative teams spread over three continents. He also presently serves as the the Executive Director of the Math Finance program at NYU's Courant Institute, the Treasurer of the Bachelier Finance Society, and a trustee for the Museum of Mathematics in New York. Prior to joining the financial industry, Dr. Carr was a finance professor for 8 years at Cornell University, after obtaining his PhD from UCLA in 1989. He has over 75 publications in academic and industry-oriented journals and serves as an associate editor for 8 journals related to mathematical finance. He was selected as Quant of the Year by Risk Magazine in 2003 and Financial Engineer of the Year by IAFE/Sungard in 2010. For the last two years, Dr. Carr has served on the CFTC's Technology Advisory Committee and was listed in Institutional Investor's Tech 50, an annual listing of the 50 most influential people in financial technology.

Abstract
Did Albert Einstein ever write that compound interest is the most powerful force in the universe? I have my doubts, but the financial crisis of 2007-8 has left little doubt that mathematical models matter for markets. In this high-level talk, I will provide a historical overview of how mathematics has been used to model markets.

Plenary Speaker
Tuesday, Aug 27, 9:00–10:00 **Room BA 201**
Emily A. Carter *Princeton University*
How Quantum Mechanics Can Help Solve the World's Energy Problems

Professor Carter is the Founding Director of the Andlinger Center for Energy and the Environment at Princeton University and the Gerhard R. Andlinger Professor in Energy and the Environment, as well as Professor of Mechanical and Aerospace Engineering and Applied and Computational Mathematics. Her current research is focused entirely on enabling discovery and design of molecules and materials for sustainable energy, including converting sunlight to electricity and fuels, providing clean electricity from solid oxide fuel cells, clean and efficient combustion of biofuels, optimizing lightweight metal alloys for fuel-efficient vehicles, and characterizing hydrogen isotope incorporation into plasma facing components of fusion reactors.

Professor Carter received her B.S. in Chemistry from UC Berkeley in 1982 (graduating Phi Beta Kappa) and her Ph.D. in Chemistry from Caltech in 1987. After a year as a postdoctoral researcher at the University of Colorado, Boulder, she spent the next 16 years on the faculty of UCLA as a Professor of Chemistry and later of Materials Science and Engineering. She moved to Princeton University in 2004. She holds courtesy appointments in Chemistry, Chemical Engineering, and three interdisciplinary institutes (PICSciE, PRISM, and PEI). The author of over 260 publications, she has delivered more than 400 invited lectures all over the world and serves on numerous international advisory boards spanning a wide range of disciplines. Her scholarly work has been recognized by a number of national and international awards and honors from a variety of entities, including the American Chemical Society (ACS), the American Vacuum Society, the American Physical Society, the American Association for the Advancement of Science, and the International Academy of Quantum Molecular Science. She received the 2007 ACS Award for Computers in Chemical and Pharmaceutical Research, was elected in 2008 to both the American Academy of Arts and Sciences and the National Academy of Sciences, in 2009 was elected to the International Academy of Quantum Molecular Science, in 2011 was awarded the August Wilhelm von Hoffmann Lecture of the German Chemical Society, and in 2012 received a Doctor Honoris Causa from the Ecole Polytechnique Federale de Lausanne.

Abstract
If we are to survive as a species on this planet, we must make major science and engineering breakthroughs in the way we harvest, store, transmit, and use energy. An overview of my own research efforts in this direction will be given, including: optimizing materials to improve efficiency of turbine engines used for power generation and aircraft propulsion, characterizing combustion of biofuels and tritium incorporation in fusion reactor walls, optimizing mechanical properties of lightweight metal alloys for fuel-efficient vehicles, optimizing ion and electron transport in solid oxide fuel cell cathodes, and designing novel materials from abundant elements for photovoltaics and photoelectrodes to convert sunlight into electricity and fuels.

Fast and accurate quantum mechanics methods enabling the treatment of large biofuel molecules and mesoscale defects in metals that control mechanical properties will be briefly discussed. Then examples of key metrics we calculate to help design efficient new materials for photovoltaics, photocatalysts, and solid oxide fuel cells will be presented. These metrics point toward which dopants or alloys are likely to provide the most efficient energy conversion materials.

Plenary Speaker
Monday, Aug 26, 9:00–10:00 **Room BA 201**
Ronald R. Coifman *Yale University*
Information Integration/Organization and Numerical Harmonic Analysis.

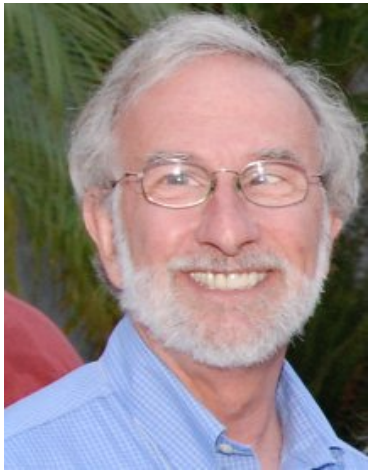
Ronald R. Coifman is Phillips professor of mathematics at Yale University. He received his Ph.D. from the University of Geneva in 1965. Prior to coming to Yale in 1980, he was a professor at Washington University in St Louis. Prof. Coifman's recent publications have been in the areas of nonlinear Harmonic Analysis , Fourier Analysis, wavelet theory, numerical analysis and scattering theory. Professor Coifman is currently leading a research program to develop new mathematical tools for efficient transcription and organization of data, with applications to feature extraction, learning classification and denoising. He was chairman of the Yale mathematics department 1986-89. He is a member of the National Academy of Sciences, American Academy of Arts and Sciences, and the Connecticut Academy of Sciences and Engineering. He received the DARPA Sustained Excellence Award in 1996, and the 1996 Connecticut Science Medal. The 1999 Pioneer award from the International Society for Industrial and applied Mathematics , the National Science Medal 1999, And the Wavelet Pioneer award 2009.

Abstract
We provide an overview of recent developments in methodologies for empirical organization of data. We present a geometric/analytic mathematical framework for learning, which revolves around building a network or a graph whose nodes are observations. In our framework, connections between observations are constantly reconfigured in order to achieve learning for specific tasks. In particular we will provide a synthesis of a range of ideas from mathematics and machine learning, which address the transition from a local similarity model to a global configuration. This is analogous to Newtonian Calculus, which from of a local linear model of variability, calculates a global solution to a differential, or partial differential equation. We apply these fundamentals to jointly organize the rows and columns of a matrix, viewed either as the matrix of a linear operator, or as a Database. Here the rows are viewed as functions on the columns and the columns as functions of the rows, a dual geometry is built to optimize prediction and processing. We relate these methods to ideas from classical Harmonic Analysis and indicate tools to measure success of information extraction. In particular we introduce methodologies that resemble "signal processing" on data matrices, enabling functional regression, prediction, denoising, compression fast numerics, and so on. We illustrate these ideas to organize and map out in an automatic and purely data driven fashion on music databases of audio segments, text documents, psychological questionnaires, medical profiles, physical sensor data, financial data.

Plenary Speaker
Friday, Aug 30, 14:00–15:00 **Room BA 201**
Martin Golubitsky *Ohio State University*
Patterns of Synchrony

Martin Golubitsky is Distinguished Professor of Natural and Mathematics Sciences at the Ohio State University, where he serves as Director of the Mathematical Biosciences Institute. He works in the fields of nonlinear dynamics and bifurcation theory studying the role of symmetry in the formation of patterns in physical systems and the role of network architecture in the dynamics of coupled systems. He has co-authored four graduate texts, one undergraduate text, and two nontechnical trade books.

Dr. Golubitsky is a Fellow of the American Academy of Arts and Sciences, AAAS, and SIAM. He is also the 2001 corecipient of the Ferran Sunyer i Balaguer Prize for The Symmetry Perspective and the recipient of the 2009 Moser Lecture Prize of the SIAM Dynamical Systems Activity Group. He has been elected to the Councils SIAM, AAAS, and AMS. Dr. Golubitsky was the founding Editor-in-Chief of the SIAM Journal on Applied Dynamical Systems and has served as President of SIAM.



Abstract
This talk will survey recent results on rigid phase-shift synchrony in periodic solutions of coupled systems of differential equations. The mathematical questions were motivated by previous work on quadrupedal gaits and will be interpreted in terms of a generalized model for binocular rivalry.

Plenary Speaker
Wednesday, Aug 28, 14:00–15:00 **Room BA 201**
Vaughan Jones *Vanderbilt University*
Computer involvement in the classification of small index subfactors

Sir Vaughan F. R. Jones (KNZM FRS FRSNZ) is a New Zealand mathematician, known for his work on von Neumann algebras and Knot Theory. He was awarded a Fields Medal in 1990 at the ICM in Kyoto. Jones is currently a distinguished professor of mathematics at Vanderbilt University. He previously served as a professor at the University of California, Berkeley and a Distinguished Alumni Professor at the University of Auckland.

Abstract
A subfactor of index k is a generalisation of a permutation group on a set of size k. Except that the number k is no longer required to be an integer- it is a real number. While the listing of all transitive permutation groups on a set of size 5 would be covered in a first class in group theory, the subfactor result has only recently been completed thanks to Morrison, Peters, Snyder and many other authors. And their computers. The classification begins with the enumeration of all possible "Principal graphs", which in index less than or equal to 4 are the usual singly laced Coxeter graphs. Ten more subfactors exist with index between 4 and 5, some of which are only accessible via computer computations. I will present these results and the local blend of computer calculation and theory, and the extent to which the computer calculations may or may not be necessary.

Plenary Speaker
Thursday, Aug 29, 9:00–10:00 **Room BA 201**
Lila Kari *Western University*
Nanocomputations by DNA Self-Assembly

Lila Kari is Professor in the Department of Computer Science at The University of Western Ontario. She received her M.Sc. in 1987 from the University of Bucharest, Romania, and her Ph.D. in 1991 for her thesis "On Insertions and Deletions in Formal Languages", for which she received the Nevanlinna Prize for the best mathematics thesis in Finland. Author of more than 170 peer reviewed articles, Professor Kari is regarded as one of the world's experts in the area of biomolecular computation, that is using biological, chemical and other natural systems to perform computations. She has served as Steering Committee Chair for the DNA Computing conference series, as Steering Committee member for the Unconventional Computation conference series, as well as on the Scientific Advisory Committee of the International Society for Nano-Scale Science and Engineering.

Lila Kari serves on the editorial boards of the journals Theoretical Computer Science, Natural Computing and Universal Computer Science, and as section editor for molecular computing for the Natural Computing Handbook (Springer). She has additionally served as a member of the Board of Directors of the FIELDS Institute for Research in Mathematical Sciences, the UK EPSRC peer review college, on the NSERC grant selection committee on computing and information systems and the NSERC Herzberg-Brockhouse-Polanyi Prize joint selection committee. At the University of Western Ontario she has received numerous awards, including the Florence Bucke Science Prize and the Faculty of Science Award for Excellence in Undergraduate Teaching. From 2002 to 2011 she was Canada Research Chair in Biocomputing, and her current research focusses on theoretical aspects of bioinformation and biocomputation, including models of cellular computation, nanocomputation by DNA self-assembly and Watson-Crick complementarity in formal languages.

Abstract
Self-assembly, the process by which objects autonomously come together to form complex structures, is ubiquitous in the physical world: Atoms bind to each other to form molecules, molecules may form crystals or macromolecules, cells interact to form biological organisms. Recent experimental research in DNA self-assembly demonstrated its potential for the parallel creation of a large number of nanostructures, including some encoding computations. This suggests exciting applications of self-assembly to circuit fabrication, nanorobotics, DNA computation, smart-drug design, and amorphous computing.

A systematic study of self-assembly as a computational process has been initiated by Adleman and Winfree. The individual components are therein modelled as square tiles on the infinite two-dimensional plane. Each side of a tile is covered by a specific "glue", and two adjacent tiles will bind to each other if they have matching glues on their abutting edges. Tiles that stick to each other may form various two-dimensional structures such as squares, rectangles, counters, or may cover the entire plane. In this talk I will describe the potential of the self-assembly of "DNA tiles" for nanocomputations. In addition, I will explore generalizations of the original model that add the possibility of having negative, "repelling", glues, as well as compare the computational power of deterministic versus non-deterministic self-assembly.

Plenary Speaker
Tuesday, Aug 27, 14:00–15:00 **Room BA 201**
Dimitrios Giannakis / Andrew Majda
The Courant Institute, New York University
Data-driven methods for dynamical systems: Quantifying predictability and extracting spatiotemporal patterns

Dr. Dimitrios Giannakis is a faculty member at the Courant Institute of Mathematical Sciences, NYU. He is also affiliated with Courant's Center for Atmosphere Ocean Science (CAOS). He received BA and MSci degrees from the University of Cambridge, and a PhD degree from the University of Chicago. Prior to joining Courant and CAOS as faculty he was a postdoctoral researcher there. Giannakis' research work is at the interface between applied mathematics and climate atmosphere ocean science. His primary research interests are in geometrical data analysis algorithms and statistical modeling of complex systems. He has applied these tools in topics including idealized dynamical systems, ocean and sea ice variability on seasonal to interannual timescales, and organized atmospheric convection.

Abstract
Large-scale datasets generated by dynamical systems arise in many applications in science and engineering. Two research topics of current interest in this area involve using data collected through observational networks or output by numerical models to quantify the uncertainty in long-range forecasting, and improve understanding of the operating dynamics. In this talk we discuss applied mathematics techniques to address these topics blending ideas from machine learning, delay-coordinate embeddings of dynamical systems, and information theory. We illustrate these techniques with applications to climate atmosphere ocean science.

This is a joint talk with Prof. Andrew Majda, Courant Institute, New York University

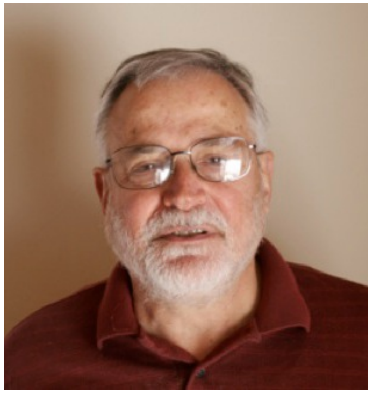
Andrew J. Majda is the Morse Professor of Arts and Sciences at the Courant Institute of New York University. Majda's primary research interests are modern applied mathematics in the broadest possible sense merging asymptotic methods, numerical methods, physical reasoning, and rigorous mathematical analysis.

Majda is a member of the National Academy of Sciences and has received numerous honors and awards including the National Academy of Science Prize in Applied Mathematics, the John von Neumann Prize of the Society of Industrial and Applied Mathematics, and the Gibbs Prize of the American Mathematical Society. He is also a member of the American Academy of Arts and Science. He has been awarded the Medal of the College de France, twice, and is a Fellow of the Japan Society for the Promotion of Science. He has received an honorary doctorate from his undergraduate alma mater, Purdue University.

In the past several years at the Courant Institute, Majda has created the Center for Atmosphere Ocean Science with a multi-disciplinary faculty to promote cross-disciplinary research with modern applied mathematics in climate modeling and prediction. Majda's current research interests include multi-scale multi-cloud modeling for the tropics, reduced stochastic and statistical modeling for climate, and novel mathematical strategies for prediction and data assimilation in complex multi-scale systems.

Plenary Speaker
Wednesday, Aug 28, 9:00–10:00 **Room BA 201**
George C. Papanicolaou *Stanford University*
Systemic Risk

George C. Papanicolaou is currently the Robert Grimmett Professor in Mathematics at Stanford University. Besides his former focus on the analysis of waves and diffusion in inhomogeneous or random media, his recent research interests also include financial mathematics, especially the use of asymptotics for stochastic equations in analyzing complex models of financial markets and in data analysis. In 1987, the University of Athens conferred an Honorary Doctor of Science on Papanicolaou. In 2000, he became a Fellow of the American Academy of Arts and Sciences and he was elected to the U.S. National Academy of Sciences. Papanicolaou was invited plenary speaker at multiple international congresses, among others at the SIAM 50th anniversary meeting in 2002 and at the International Congress of Industrial and Applied Mathematics in 2003. In 2006, he received the SIAM von Neumann Prize in recognition of his wide-ranging work on analytic and stochastic methods and their application to the modeling of phenomena in the physical, geophysical, and financial sciences. In 2010 he received the William Benter Prize in Applied Mathematics. In 2011 he was the Gibbs lecturer of the American Mathematical Society. The University of Paris Diderot conferred on him the degree Doctor Honoris Causa in 2011.



Abstract
The quantification and management of risk in financial markets is at the center of modern financial mathematics. But until recently, risk assessment models did not consider seriously the effects of inter-connectedness of financial agents and the way risk diversification impacts the stability of markets. I will give an introduction to these problems and discuss the implications of some mathematical models for dealing with them.

Plenary Speaker
Thursday, Aug 29, 14:00–15:00 **Room BA 201**
Panos M. Pardalos *University of Florida*
Optimization and Modeling in Energy Systems

Panos M. Pardalos serves as Distinguished Professor of Industrial and Systems Engineering at the University of Florida. He is also an affiliated faculty member of the Computer and Information Science Department, the Hellenic Studies Center, and the Biomedical Engineering Program. He is also the Director of the Center for Applied Optimization. Dr. Pardalos is a world leading expert in global and combinatorial optimization. His recent research interests include network design problems, optimization in telecommunications, e-commerce, data mining, biomedical applications, and massive computing.

Abstract
For decades, power systems have been playing an important role in humanity. Industrialization has made energy consumption an inevitable part of daily life. Due to our dependence on fuel sources and our large demand for energy, power systems have become interdependent networks rather than remaining independent energy producers. This talk will focus on the problems arising in energy systems as well as recent advances in optimization and modeling to address these problems. Among the topics to be discussed are emission constrained hydrothermal scheduling, electricity and gas networks expansion, as well as reliability analysis of power grid.

Plenary Speaker
Monday, Aug 26, 14:00–15:00 **Room BA 201**
Israel Michael Sigal *University of Toronto*
Superconductivity and automorphic functions

Israel Michael Sigal is the Norman Stuart Robertson Chair in Applied Mathematics and University Professor at the University of Toronto. He works in several areas of mathematical physics. Among his results are the proof (jointly with Avy Soffer) of asymptotic completeness of the quantum many-body scattering for short-range potentials and the development of a mathematical framework (jointly with Volker Bach and Jurg Frohlich) of the theory of emission and absorption of quantum radiation by non-relativistic quantum systems such as atoms and molecules, as well as several important results on the nonlinear Schrodinger, Ginzburg-Landau, mean-curvature and wave equations. Professor Sigal was an invited speaker at several International Congresses of Mathematical Physics and at an International Congress of Mathematicians.

Abstract
Macroscopic theory of superconductivity is based on the celebrated Ginzburg - Landau equations. First developed to explain and predict properties of superconductors, these equations had a profound influence on physics well beyond their original designation area. These are a pair of coupled nonlinear equations for a complex function (called order parameter or Higgs field) and a vector field (magnetic potential or gauge field). They are the simplest representatives of a large family of equations appearing in physics and mathematics. (The latest variant of these equations is the Seiberg - Witten equations.) Besides of importance in physics, they contain beautiful mathematics (some of the mathematics was discovered independently by A. Turing in his explanation of patterns of animal coats). In this talk I will review recent results involving key solutions of these equations - the magnetic vortices and vortex lattices, their existence, stability and dynamics, and how they relate to the modified theta functions appearing in number theory. Some automorphic functions play a key role in this theory.

Plenary Speaker
Friday, Aug 30, 9:00–10:00 **Room BA 201**
Godfried T. Toussaint *NYUAD/M.I.T./McGill*
Phylogenetic Analysis of the Musical Rhythms of the World

Godfried T. Toussaint is a Research Professor of Computer Science at New York University Abu Dhabi in Abu Dhabi, United Arab Emirates. He is also an affiliate researcher in the Computer Science and Artificial Intelligence Laboratory at the Massachusetts Institute of Technology in Cambridge, MA, USA. For many years he taught and did research in the School of Computer Science at McGill University in Montreal, in the areas of information theory, pattern recognition, textile-pattern analysis and design, computational geometry, machine learning, music information retrieval, and computational music theory. In 2005 he became a researcher in the Centre for Interdisciplinary Research in Music Media and Technology, in the Schulich School of Music at McGill University, in Montreal, Canada.

Dr. Toussaint is a founder and co-founder of several annual international conferences and workshops, including the ACM Symposium on Computational Geometry, and the Canadian Conference on Computational Geometry. He is an editor of several journals, including Computational Geometry: Theory and Applications, the International Journal of Computational Geometry and Applications, ISRN Geometry, and the Journal of Mathematics and the Arts. He is the recipient of several distinguished awards including a Killam Fellowship from the Canada Council for the Arts, and a Radcliffe Fellowship from Harvard University, where he spent one year at the Radcliffe Institute for Advanced Study, and one year in the Music Department. His research on the phylogenetic analysis of musical rhythms has been reported in several media, and was the focus of two Canadian television programs. He is the author of more than 390 publications.

Latest Book: The Geometry of Musical Rhythm, Chapman-Hall/CRC Press, January, 2013.

Abstract
The application of computational-mathematical tools to the analysis of symbolically notated musical rhythms of the world informs musicological issues such as whether one group of rhythms is more complex than another, whether one family of rhythms possesses an underlying metrical hierarchy, or how an evolutionary phylogeny of musical rhythms may be constructed. Recent results on these problems will be illustrated with examples. To submit rhythms to a phylogenetic analysis, a measure of similarity between rhythms is usually employed.

Two fundamental approaches to measuring the similarity between rhythms are compared: a feature-based technique and a transformation method. In the former procedure, statistical and/or structural features are computed from a suitable representation of the rhythms, thus representing them as points in a feature space. Two rhythms are considered to be similar if the distance between their corresponding points in this feature space is small. In the latter strategy a rhythm is represented as a binary sequence of symbols denoting onsets (sounds) and rests (silences), and a distance measure called the edit-distance is used. The edit distance between two rhythms is the minimum number of mutations required to transform one rhythm to the other. Here the mutations consist of insertions, deletions, and substitutions of onsets and rests. A phylogenetic analysis using the BioNJ algorithm from the SplitsTree-4 software package, incorporating the edit distance, applied to several collections of the musical rhythms practiced in several cultures around the globe, yields new insights into the paradigmatic roles played by the most salient rhythms.

6 Semi-Plenary Speakers

Wednesday, Aug 28, 16:50–17:50 **Room BA 202**
Julien Arino *University of Manitoba*
The spatio-temporal spread of drug-resistant tuberculosis

Julien Arino received his PhD in 2001 from Université Joseph Fourier in Grenoble, France in affiliation with INRIA Sophia Antipolis and the Villefranche-sur-mer Oceanological Observatory. He held postdoctoral fellowships at the University of Victoria (Jan 2001-Dec 2002) and McMaster University (Jan 2003-Jun 2005).

Since 2005, he has been a faculty member at the University of Manitoba. He is currently a member of the Bio.Diaspora Project, which is based at St Michael's Hospital (Toronto), and the Centre for Disease Modelling, which is hosted at York University.

Abstract
Tuberculosis is, after HIV/AIDS, the second largest cause of infectious disease induced death. It is estimated that in 2011, it killed 1.4 million people worldwide. Tuberculosis is also a disease of poverty, as contributing factors to its spread include poor and overcrowded living conditions, poor health conditions, etc. As a consequence, over 95% of new infections and deaths by tuberculosis occur in developping countries.

We formulate a model for tuberculosis in a single population that includes three strains: a drug-sensitive strain, MDR-TB and XDR-TB. We study the model mathematically and show, in particular, that the bifurcation structure of the whole model is governed by the behaviour of the XDR-TB strain. We then extend the model to a metapopulation setting, in which each country is a vertex in a multi-digraph, endowed with a system for the single population case. Weighted arcs between the vertices represent the rate of travel of individuals between the countries. We study the resulting large-scale system. Finally, we proceed to numerical experiments with realistic travel and population data.

This is a joint work with K. Khan (University of Manitoba) and I. Soliman (St Michael's Hospital, Toronto).

Semi-Plenary Speaker
Monday, Aug 26, 15:30–16:30 **Room BA 110**
Steven Brams *New York University*
Fair Division

Steven J. Brams is Professor of Politics at New York University and the author, co-author, or co-editor of 18 books and more than 250 articles. His books include Theory of Moves (Cambridge, 1994) and, co-authored with Alan D. Taylor, Fair Division: From Cake-Cutting to Dispute Resolution (Cambridge, 1996) and The Win-Win Solution: Guaranteeing Fair Shares to Everybody (Norton, 1999). His newest books are Mathematics and Democracy: Designing Better Voting and Fair-Division Procedures (Princeton, 2008) and Game Theory and the Humanities: Bridging Two Worlds (MIT, 2011). He holds two patents for fair-division algorithms and is chairman of the advisory board of Fair Outcomes, Inc.

Brams has applied game theory and social-choice theory to voting and elections, bargaining and fairness, international relations, and the Bible, theology, and literature. He is a former president of the Peace Science Society (1990-91) and of the Public Choice Society (2004-2006). He is a Fellow of the American Association for the Advancement of Science (1986), a Guggenheim Fellow (1986-87), and was a Visiting Scholar at the Russell Sage Foundation (1998-99).

Abstract
Over the past 20 years, there has been burgeoning interest in the subject of fair division — how one divides a single divisible good (e.g., a cake), or multiple indivisible goods (e.g., the marital property in a divorce), to satisfy such properties as efficiency, envy-freeness, and equitability. Some of the major possibility and impossibility results – relating to both the existence of such a division and algorithms for producing it – will be reviewed. How these results apply to dividing land, allocating items in a family estate to heirs, determining which rooms housemates get and how much of the rent each pays for its room, and matching applicants to colleges will be among the applications discussed.

Semi-Plenary Speaker
Monday, Aug 26, 15:50–16:50 **Room BA 101**
Bernd Hofmann *Technical University of Chemnitz*
On an Inverse and Ill-Posed Problem of Autoconvolution Type in Ultrashort Laser Pulse Characterization

Dr. Bernd Hofmann is professor for Analysis and Inverse Problems at the Chemnitz University of Technology, Germany, in the Department of Mathematics since 1993, where he served as Dean of the Faculty from 2006 to 2009. He established an interdisciplinary research group on inverse problems with applications in natural sciences, engineering and finance, organizing the annual 'Chemnitz Symposium on Inverse Problems', sometimes on tour (in Linz 2009, Canberra 2012, and Shanghai 2013).

Dr. Hofmann's research focus is on regularization theory and practice as well as on studies concerning the nature of ill-posedness and appropriate tools for the treatment of ill-posedness phenomena. He works as a member of the Editorial Board of the journals 'Inverse Problems' and 'Journal of Inverse and Ill-Posed Problems'.

Abstract
In the early 1990s motivated by applications from spectroscopy and stochastics contributions to the mathematical analysis of deautoconvolution problems as a class of inverse problems in spaces of continuous or quadratically integrable real functions were made. Such deautoconvolution problems were mostly aimed at finding non-negative functions with compact support from observations of its autoconvolution. Since the autoconvolution operator is nonlinear and smoothing, the deautoconvolution problem is ill-posed in the sense that the solutions need not be uniquely determined and mainly small perturbations in the data may lead to arbitrarily large errors in the solution. To overcome the negative consequences of ill-posedness some kind of regularization is required. Recently, the research group 'Solid State Light Sources' of the Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, hit on the autoconvolution problem in the context of a new approach in ultrashort laser pulse characterization called Self-Diffraction SPIDER. For phase reconstruction as an auxiliary problem the solution of an autoconvolution equation is needed, but now for complex functions to be determined from complex observations. Moreover, a device-related kernel function must be added. The ill-posedness phenomenon arises in the complex case, too, but a thorough analysis of the complex case in deautoconvolution was missing in the literature. The talk presents analytical and numerical results on the character of ill-posedness of the equation occurring as a part of the SD SPIDER approach. Moreover, an iterative regularization approach is suggested for the problem when only noisy data of are given.

Semi-Plenary Speaker
Tuesday, Aug 27, 15:50–16:50 **Room BA 202**
Eili Klein *John Hopkins University*
Ecological and Epidemiological Drivers of Viral Evolution

Dr. Eili Klein is an assistant professor at John Hopkins University in the Centre for Advanced modeling in the Social, Behavioural and Health Sciences; Dr. Klein also holds a fellow position at the Center for Disease Dynamics, Economics and Policy, in Washington, D.C. He received his PhD in ecology and evolutionary biology from Princeton University and has held research associate positions at the Center for Disease Dynamics, Economics and Policy and Resources for the Future.

Dr. Klein's interdisciplinary research involves ecology, epidemiology, economics, and human behaviour. His scientific interests include: factors that drive antimicrobial drug resistance; economic epidemiology; how human behaviour influences ecology/epidemiological dynamics; and how human behaviour influences evolution of an infectious disease.

Abstract
While it has long-been recognized that disease transmission is impacted by human behavior, the consequences of human behavior on the ecology of directly transmitted pathogens has been understudied. Using a biophysical model of virus stability, we examine how much of virus evolution is driven by epidemiological factors, such as contact rates and protective behavior, and how much is driven by biological characteristics of the virus, such as its growth rate. We use agent-based models, which scale from local to planetary to elucidate the driving factors for both endemic and epidemic directly transmitted viruses.

Semi-Plenary Speaker
Monday, Aug 26, 10:30 – 11:30 **Room BA 111**
Mel Levy *Duke University*
Variational Principles in Wave-Functional and Density- Functional Formulations of Quantum Mechanics

Born 1941, in Brooklyn, New York.

Professor Emeritus, Tulane University and North Carolina A&T State University. Visiting Professor, Duke University (2007-). Professor, North Carolina Agricultural and Technical State University, 2002-2007. Professor, Tulane University, 1976-2002 (presently, Professor Emeritus). Visiting Professor or Visiting Scientist: Oak Ridge National Laboratory; Quantum Theory Project, University of Florida; Instituto Venezolano de Investigaciones Cientificas (I.V.I.C.), Caracas, Venezuela; Institute for Theoretical Physics, University of California at Santa Barbara; Institute of Theoretical Physics, Kossuth Lajos University, Debrecen, Hungary; Department of Physics and Theory Center Cornell University; Lecturer, Department of Chemistry, the University of North Carolina at Chapel Hill, 7/74-7/76.

International Academy of Quantum Molecular Science; International Academy of Mathematical Chemistry; Fellow of The American Physical Society; Editorial Board, Advances in Quantum Chemistry; Advisory Editorial Board, Theoretical Chemistry Accounts; Advisory Editorial Board, Progress in Theoretical Chemistry; Guest Editor: The International Journal of Quantum Chemistry; Tulane Liberal Arts and Sciences, Faculty Research Award, 1998.

Abstract
Variational theorems are important for obtaining approximate solutions to the Schroedinger equation. With this in mind, fundamental variational principles will first be discussed within the wave-functional formulation of quantum mechanics. Then the corresponding variational principles for ground states in density and density-matrix functional theories will be reviewed briefly for the non-degenerate and degenerate situations. Based on these variational principles, properties of the exact functionals will be presented that are difficult to satisfy with approximate functionals. Special emphasis will be given to degeneracies, coordinate scaling, and potentials (functional derivatives). Then, a new time-independent density-functional theory for excited states will be presented for Coulomb systems. The lecture will conclude with a description of certain relevant unsolved mathematical problems, such as one involving an ionization energy convexity property.

Semi-Plenary Speaker
Thursday, Aug 29, 15:50–16:50 **Room BA 101**
Silvina Matysiak *University of Maryland*
Role of dipolar interactions in protein folding

Dr. Silvina Matysiak is an assistant professor in the Fischell Department of Bioengineering at the University of Maryland College Park. She received her B.S. in Chemical Engineering from the Instituto Tecnolgico de Buenos Aires in 2001 and her PhD in Chemistry from Rice University in 2007. Before joining Maryland, she was a postdoctoral fellow at the University of Texas at Austin.

Matysiak's primary area of interest is the characterization of protein dynamics and function at the molecular level. Her work includes using computer simulations to study the mechanism of protein folding and misfolding associated with neurodegenerative diseases, development of multiscale simulation approaches to bridge different time- and length-scales and how solvent organization affects cooperative transitions in biomolecular systems.

Abstract
The role of dipole interactions in protein folding A generic coarse-grained (CG) protein model will be presented to characterize the driving forces behind protein folding. The change in orientation of the atoms in the coarse-grained unit is captured by the addition of Drude oscillators inside each polar coarse-grained bead. The addition of dummy sites inside the polar beads introduces structural polarization into the coarse-grained model.

Realistic alpha/beta content is achieved de novo without any biases in the force-field toward a particular secondary structure. The dipoles created by the Drude oscillators interact with each other and drive the protein models to fold into unique structures depending on the amino acid patterning and presence of capping residues. In this talk, we will show the role of dipole-dipole and dipole-charge interactions in shaping the secondary and tertiary structure of proteins. In particular, we will focus on the folding of beta-hairpins and single helices and in helix bundles and multiple beta-sheet strands. In the folded ensemble, dipoles along a helix are found aligned parallel and stabilized by the presence of charged capping residues. On the other hand, beta-sheets exhibit antiparallel neighboring dipoles.

Semi-Plenary Speaker
Tuesday, Aug 27, 15:50–16:50 **Room BA 208**
Nicolae Tarfulea *Purdue University Calumet*
Boundary Conditions for Constrained Hyperbolic Systems: Mathematical and Numerical Analysis

Dr Nicolae Tarfulea is Associate Professor in the Department of Mathematics, Computer Science & Statistics, Purdue University Calumet. He received his PhD from the University of Minnesota and his M.S. in Mathematics from the Penn State University in 2004 and 2001, respectively. His main research Interests are in Partial Differential Equations; Numerical Analysis; General Relativity. More precisely: boundary conditions for hyperbolic formulations of Einstein's equations, nonlinear elliptic equations, reaction diffusion systems, compressed sensing, and finite element methods. He has published 23 papers on these subjects in some of the most prestigious journals of mathematics, and gave over 20 invited talks in the last five years, and been a part of six research grants.

Abstract
Many applications in sciences and technology lead to first order symmetric hyperbolic (FOSH) systems of differential equations supplemented by constraint equations. The Cauchy problem for many such FOSH systems is constraint-preserving, i.e., the solution satis?es certain spatial differential constraints whenever the initial data does (e.g., Maxwell's equations or Einstein's field equations in various FOSH formulations). Frequently, artificial space cut offs are performed for such evolution systems, usually out of the necessity for finite computational domains. However, it may easily happen that boundary conditions at the artficial boundary for such a system lead to an initial boundary value problem which, while well-posed, does not preserve the constraints. Therefore, boundary conditions have to be posed in such a way that the numerical solution of the cut off system approximates as best as possible the solution of the original problem on infinite space, and this includes the preservation of constraints. It has become increasingly clear that in order for constraints to be preserved during evolution, the boundary conditions have to be chosen in an appropriate way. Here we consider the problem of finding constraint-preserving boundary conditions for constrained FOSH systems in the well-posed class of maximal nonnegative boundary conditions. Based on a characterization of maximal nonnegative boundary conditions, we discuss a systematic technique for finding such boundary conditions that preserve the constraints, pending that the constraints satisfy a FOSH system themselves. We exemplify this technique by presenting a few relevant applications (e.g., for FOSH formulations of Einstein's equations and for systems of wave equations in FOSH formulation subject to divergence constraints).

Semi-Plenary Speaker
Wednesday, Aug 28, 16:50–17:50 **Room BA 101**
Peter Tieleman *University of Calgary*
Martini coarse-grained and atomistic simulations of lipids

Peter Tieleman studied physical chemistry at the University of Groningen in the Netherlands, where he obtained his PhD under the supervision of Herman Berendsen, one of the pioneers of biomolecular simulation. After a year as a European Molecular Biology Organization fellow at the University of Oxford in Mark Sansom's research group, Tieleman joined the University of Calgary. Since 2005, he has been a Professor in the Department of Biological Sciences. His research interests are in biomolecular simulation and computational biology, with an emphasis on biochemical and biophysical problems involving cell membranes. Among his distinctions are an Alfred P. Sloan Foundation Fellowship, the Royal Society of Canada's Rutherford Memorial Medal in Chemistry, and a Natural Sciences and Engineering Research Council of Canada (NSERC) Steacie Memorial Fellowship.

Abstract
Computer simulations have been widely used to study properties of lipid aggregates. Over the past twenty years simulations have progressed from small models of lipid bilayers composed of one type of lipid at length scales of 5-8 nanometer and time scales of nanoseconds to very complex models at length scales of tens of nanometers and time scales of microseconds. The development of realistic coarse-grained models such as the MARTINI model has brought simulations of lipids to mesoscope scales where particle-based simulation and continuum models overlap and simulations can be compared to measurable mechanical parameters of lipid aggregates. MARTINI is parameterized primarily based on experimental data, but for many systems of biological importance there is limited experimental data that can be used in parameterization and validation. I will discuss recent progress in linking atomistic simulations, experimental results, and parameters from continuum models to MARTINI simulations, illustrated with examples on lipid mixtures, membrane tethers, and lipid-protein systems.

Special Invited Speaker
Thursday, Aug 29, 15:50–16:50 **Room BA 208**
Catherine Mavriplis *University of Ottawa*
Fifteen years of funded programs to advance women in science and engineering: progress and persistent challenges

Catherine Mavriplis, PhD, PE is an Associate Professor of Mechanical Engineering at the University of Ottawa and the NSERC Chair for Women in Science and Engineering (Ontario region). Dr. Mavriplis has been a professor of Mechanical and Aerospace Engineering since 1991, primarily at the George Washington University in the United States. She has also worked at the US National Science Foundation (NSF) in Mathematics and the University of Oklahoma in Meteorology. Her specialization is in Computational Fluid Dynamics and through application of her numerical modeling skills she has been involved in a number of interdisciplinary projects.

She maintains a strong collaboration with several U.S. researchers and the Royal Institute of Technology in Sweden. She currently serves on the Board of Directors of the Computational Fluid Dynamics Society of Canada. Dr. Mavriplis has worked under NSF funding to advance women since 1996, notably through the FORWARD to Professorship workshops under the NSF ADVANCE program, reaching up to 1,300 science and engineering doctoral women by 2013.

Abstract
I will discuss my work in advancing women in science and engineering through US National Science Foundation funding since 1997 and, more recently, since 2011, Canadas Natural Sciences and Engineering Research Council Chair for Women in Science and Engineering program. The FORWARD to Professorship program, in particular, has been a successful vehicle to empowering doctoral women who consider academic careers. Results of a survey of all 1300 FORWARD participants since 2003 will be presented, giving a picture of how this group of talented and motivated women are advancing and how the climate is changing. My work in Canada has also included women in industry, in particular with the Chair sponsor, Pratt & Whitney Canada, an aircraft engine manufacturer based in Montreal. I will discuss activities designed for mid-career professional women in industry as well as some initiatives for boosting numbers of women in computing.

7 Special Symposia and Organizers

SS-AAIP	Applied Analysis and Inverse Problems	Herb Kunze *(Math and Stats, Guelph)* Kimberly Levere *(School of Engineering, Guelph)*
SS-ADS	Canada-China Session on Applied Dynamic Systems	Yuming Chen *(Wilfrid Laurier University)* Fengqin Zhang *(Yuncheng University)* Xingfu Zou *(Western University)*
SS-ANMPDE	Advanced Numerical Methods for PDEs and Applications	Christina C. Christara *(University of Toronto)* Peter A. Forsyth *(University of Waterloo)* Dong Liang (York University)
SS-CDPB	Complex Dynamics of Population Behaviour	Stephen Tully *(Guelph)* Scott Greenhalgh *(Yale)* Chad Wells *(Yale)* Chris Pagnutti *(Guelph)*
SS-CF	Numerical Methods for Computationally Intensive Problems in Mathematical Finance	Duy-Minh Dang *(University of Waterloo)* Ken Jackson *(University of Toronto)*
SS-CFDRA	Computational Fluid Dynamics for Real Applications	Lakhdar Remaki *(BCAM, Spain)* Stéphane Moreau *(Sherbrooke)* Abdelkader Baggag *(Laval)*
SS-CMAIS	Control Methods for Advanced Industrial Systems	Behzad Samadi *(Maplesoft)* Jürgen Gerhard *(Maplesoft)*
SS-CMS	Computational Materials Science	Haipeng Wang *(NPU and University of Toronto)* Ziad Saghir *(Ryerson University)*
SS-CPH	Computational Photonics	Marek Wartak *(Wilfrid Laurier University)* Harry E. Ruda *(University of Toronto)*
SS-CSB	Computations in Systems Biology	Hin Hark Gan *(NYU)* Gaurav Arya *(UCSD)*
SS-DBCNDE	Dynamics and Bifurcations in Coupled Networks of Differential Equations: Theory and Applications	Luciano Buono *(UOIT)*
SS-DFT	Density Functional Theory	Ian Hamilton *(Wilfrid Laurier University)* Paul Ayers *(McMaster)* Viktor Staroverov *(Western)*
SS-DG	Decisions and Games	D. Marc Kilgour *(Wilfrid Laurier University)* Marcus Pivato *(Trent University)*
SS-EGT	Evolutionary Game Theory	Joe Apaloo *(St. Francis Xavier)* Ross Cressman *(Wilfrid Laurier University)*
SS-GLS	Geocomputational Landscapes and Spaces	Steven A. Roberts *(Wilfrid Laurier University)* Colin Robertson *(Wilfrid Laurier University)*

Special Symposia and Organizers

SS-HOMCFD	Higher-Order Methods in Computational Fluid Dynamics	Lilia Krivodonova *(University of Waterloo)* Hans De Sterck *(University of Waterloo)*
SS-HPTC	Recent Progress in Hyperbolic Problems: Theory and Computation	Jae-Hun Jung *(SUNY University at Buffalo)* Lilia Krivodonova *(University of Waterloo)* Allen Tesdall *(CUNY College of Staten Island)*
SS-IM	Industrial Mathematics	Sean Bohun *(UOIT)*
SS-LSNE	Lie Symmetry and Other Approaches in Theory and Applications of Nonlinear Equations	C.M. Khalique *(North-West University, RSA)* M. Abudiab *(Texas A&M University, USA)*
SS-MACBE	Modeling Approaches and Challenges in the Built Environment	Ryan Danks *(RWDI)* Michael Carl (RWDI)
SS-MCMMBM	Modeling and Computational Methods for Mathematical Biology and Medicine	Suzanne Shontz *(Mississippi State)* Corina Drapaca *(Penn State)* Siv Sivaloganathan *(Wilfrid Laurier University)*
SS-ME	Mathematical Epidemiology	Connell McCluskey *(Wilfrid Laurier University)*
SS-MFMCR	Theory and Applications in Finance	Joe Campolieti *(Wilfrid Laurier University)* Adam Metzler *(Wilfrid Laurier University)*
SS-MHP	Mathematics of Human Placenta: a Window into Fetal Origins of Adult Disease	C.M. Salafia *(Placental Analytics, LLC)* O. Shlakhter *(Alberta Health Services)* C.M. Salafia *(M. Yampolsky (Mathematics Department, University of Toronto)*
SS-MIPD	Mathematical Immunology and Pathogen Dynamics	Jane Heffernan *(CDM, Math & Stats, York U)* Cameron Browne *(University of Ottawa)* Stanca Ciupe *(Virginia Tech University)* Jonathan Forde *(Hobart and William Smith Colleges)*
SS-MMNN	Mathematical Models for Nanoscience and Nanotechnology	Z.L. Miskovic *(University of Waterloo)* A.H. Majedi *(University of Waterloo)*
SS-MSEPSW	Multitaper Spectrum Estimation, Prolate Spgeroidal Wave Functions, Quadratic-Inverse, and Related Problems	Wesley Burr *(Queen's University)* Charlotte Haley *(Queen's University)* David J. Thomson (Queen's University)
SS-NCTAP	New Computational Techniques for Applied Problems in Science and Engineering	Ludwig Kohaupt *(Beuth University of Technology Berlin)* Yan Wu *(Georgia Southern University)*

Special Symposia and Organizers

SS-NMDAEA	Numerical Methods for Differential-Algebraic Equations and Applications	Andreas Griewank *(Humbold University, Germany)* Ned Nedialkov *(Cardiff University, UK)* John Pryce *(Cardiff University, UK)*
SS-QCTA	Quantum Control: Theory and Application	Lian-Ao Wu *(IKERBASQUE, Basque Foundation of Science and University of the Basque Country, Spain)*
SS-RPSETS	Recent Progress in Spintronics: Experiment and Dynamical Systems	Jingrun Chen *(UC Santa Barbara)* Xu Yang (UC Santa Barbara)
SS-RTDEDS	Recent Trends in Differential Equations and Dynamical Systems	Xinzhi Liu *(University of Waterloo)* Mohamad Alwan *(University of Waterloo)* Hongtao Zhang *(University of Waterloo)*
SS-RWFDNO	Continuous-time Random Walks, Fractional Diffusion and Non-local Operators: Applications to Physics, Finance, and Engineering	Mark M. Meerschaert *(Michigan State University, USA)* Enrico Scalas *(University of Eastern Piedmont, Italy and BCAM - Basque Center for Applied Mathematics, Basque Country, Spain)*
SS-SAEEM	Statistical Aspects of Environmental and Ecological Modeling	Vyacheslav Lyubchich *(University of Waterloo)* Yulia R. Gel *(University of Waterloo)*
SS-SCT	Social Choice Theory	D. Marc Kilgour *(Wilfrid Laurier University)* Marcus Pivato *(Trent University)*
SS-SDAG	Statistical Data Analysis and Geometry	Shoja Chenouri *(University of Waterloo)* Paul Marriott *(University of Waterloo)*
SS-SGT	Structured Graph Theory	Chinh Hoang *(Wilfrid Laurier University)* Kathie Cameron *(Wilfrid Laurier University)*
SS-SNDTA	Symmetry in Nonlinear Dynamics: Theory and Applications	Manuele Santoprete *(Wilfrid Laurier University)* Ray McLenaghan *(University of Waterloo)*
SS-SSMMBP	Simulations in Soft Matter and Molecular Bio-Physics	Cristiano L. Dias *(New Jersey Institute of Technology)*
SS-VPPO	Variational Problems of Physical Origin	Robert Jerrard *(University of Toronto)* Andrew Lorent *(University of Cincinnati)*
SS-WSM	Women in Science and Mathematics	Shohini Ghose *(Wilfrid Laurier University)* Hind Al-Abadleh *(Wilfrid Laurier University)*

8 Conference Schedule

8.1 Monday, August 26, 2013

	Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
08:30-09:00	**AMMCS Conference Opening** *BA201* **Max Blouw** *Wilfrid Laurier University President and Vice-Chancellor, Chair of the Council of Ontario Universities* **Paul Jessop** *Dean of Science, Wilfrid Laurier University* **Angela Vieth** *Councillor, City of Waterloo*				
09:00-10:00	**Plenary Talk** BA 201 - Chair: R. Melnik **Information Integration/Organization and Numerical Harmonic Analysis.** **Ronald Coifman** Yale University - Abstract and Biography - p 7				
10:00-10:30	**Coffee Break**: BA Hallways				
10:30-12:30	**SS-AAIP - 1** Applied Analysis & Inverse Problems	**SS-HPTC - 1** Recent progress in hyperbolic problems: Theory and Computation	**SS-DG&SCT - 1** Decision Games and Social Choice Theory	**SS-DFT - 1** Density Functional Theory	**SS-SDAG** Statistical Data Analysis and Geometry
12:30-14:00	**Lunch**				
14:00-15:00	**Plenary Talk** BA 201 - Chair: R. Melnik **Dynamics of Magnetic Vortices and Decoherence** **Israel Michael Sigal** The University of Toronto - Abstract and Biography - p 14				
15:00-15:30	**Coffee Break** BA Hallways				
15:30-17:50	**SS-AAIP - 2** Applied Analysis & Inverse Problems	**SS-HPTC - 2** Recent progress in hyperbolic problems: Theory and Computation	**SS-DG&SCT - 2** Decision Games and Social Choice Theory	**SS-DFT - 2** Density Functional Theory	**SS-RWFDNO** Continuous-time random walks, fractional diffusion and non-local operators: Applications

Monday, August 26, 2013

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
08:30-09:00	**AMMCS Conference Opening** **Max Blouw** *Wilfrid Laurier University President and Vice-Chancellor, Chair of the Council of Ontario Universities* **Paul Jessop** *Dean of Science, Wilfrid Laurier University* **Angela Vieth** *Councillor, City of Waterloo*				
09:00-10:00	**Plenary Talk** BA 201 - Chair: R. Melnik **Information Integration/Organization and Numerical Harmonic Analysis.** **Ronald Coifman** Yale University - Abstract and Biography - p 7				
10:00-10:30	**Coffee Break**: BA Hallways				
10:30-12:30	**CS-MODELING-1 1** Partial Differential and Integral Equations in Mathematical Modeling	**SS-MHP-1** Mathematics of human placenta: a window into fetal origins of adult disease	**SS-MCMMBM-1** Modeling and Computational Methods for Mathematical Biology and Medicine	**SS-MACBE-1** Modeling approaches and challenges in the built enviroment	**CS-DSDE-1** Applications of Dynamical Systems and Differential Equations
12:30-14:00	**Lunch**				
14:00-15:00	**Plenary Talk** BA 201 - Chair: R. Melnik **Dynamics of Magnetic Vortices and Decoherence** **Israel Michael Sigal** The University of Toronto - Abstract and Biography - p 14				
15:00-15:30	**Coffee Break** BA Hallways				
15:30-17:50	**SS-CSB** Computations in Systems Biology	**SS-MHP-2** Mathematics of human placenta: a window into fetal origins of adult disease	**SS-MCMMBM-2** Modeling and Computational Methods for Mathematical Biology and Medicine	**SS-MACBE-2** Modeling approaches and challenges in the built enviroment	**CS-DSDE-2** Applications of Dynamical Systems and Differential Equations

8.2 Tuesday, August 27, 2013

	Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
09:00-10:00	**Plenary Talk** BA 201 - Chair: M. Levy **How Quantum Mechanics Can Help Solve the World's Energy Problems** **Emily Carter** Princeton University - Abstract and Biography - p 6				
10:00-10:30	**Coffee Break**: BA Hallways				
10:30-12:30	**SS-AAIP-3** Applied Analysis & Inverse Problems	**SS-HPTC-3** Recent progress in hyperbolic problems: Theory and Computation	**SS-DG&SCT-3** Decision Games and Social Choice Theory	**CS-CACO-1** Computational Algebra, Combinatorics and Optimization	**SS-MSEPSW-1** Multitaper Spectrum Estimation, Prolate Spheroidal Wave Functions, Quadratic-Inverse, and Related Problems
12:30-14:00	**Lunch**				
14:00-15:00	**Plenary Talk** BA 201 - Chair: B. Hofmann **Data-driven methods for dynamical systems: Quantifying predictability and extracting spatiotemporal patterns** **Dimitrios Giannakis / Andrew Majda, Courant Institute, New York University** - Abstract and Biography - p 11				
15:00-15:30	**Coffee Break** BA Hallways				
15:30-17:30	**SS-AAIP-4** Applied Analysis & Inverse Problems	**SS-HPTC-4** Recent progress in hyperbolic problems: Theory and Computation		**SS-DFT-3** Density Functional Theory	**SS-MSEPSW-2** Multitaper Spectrum Estimation, Prolate Spheroidal Wave Functions, Quadratic-Inverse, and Related Problems

Tuesday, August 27, 2013

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211	Room BA305
09:00-10:00	**Plenary Talk** BA 201 - Chair: M. Levy **How Quantum Mechanics Can Help Solve the World's Energy Problems** **Emily Carter** Princeton University - Abstract and Biography - p 6					
10:00-10:30	**Coffee Break**: BA Hallways					
10:30-12:30	**SS-CDPB-1** Complex Dynamics of Population Behaviour	**SS-NCTAP-1** New Computational Techniques for Applied Problems in Science and Engineering	**SS-CPH** Computational Photonics	**CS-FINANCE-1** Financial Mathematics and Computation	**CS-DSDE-3** Applications of Dynamical Systems and Differential Equations	**CS-MODELING-2** Partial Differential and Integral Equations in Mathematical Modeling
12:30-14:00	**Lunch**					
14:00-15:00	**Plenary Talk** BA 201 - Chair: B. Hofmann **Data-driven methods for dynamical systems: Quantifying predictability and extracting spatiotemporal patterns** **Dimitrios Giannakis / Andrew Majda, Courant Institute, New York University** - Abstract and Biography - p 11					
15:00-15:30	**Coffee Break** BA Hallways					
15:30-17:30	**SS-CDPB-2** Complex Dynamics of Population Behaviour	**SS-NCTAP-2** New Computational Techniques for Applied Problems in Science and Engineering		**CS-FINANCE-2** Financial Mathematics and Computation	**CS-BSM-1** Mathematics and Computation in Biological Sciences and Medicine	**CS-MODELING-3** Partial Differential and Integral Equations in Mathematical Modeling

8.3 Wednesday, August 28, 2013

	Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
09:00-10:00	**Plenary Talk** BA 201 - Chair: R. Melnik **Systemic Risk** **George Papanicolau** Stanford University - Abstract and Biography - p 12				
10:00-10:30	**Coffee Break**: BA Hallways				
10:30-12:30	**SS-SSMMBP-1** Simulations in soft matter and molecular Bio-Physics	**SS-HPTC-5** Recent progress in hyperbolic problems: Theory and Computation	**SS-MFMCR-1** Mathematical Finance - Modeling, Computation and Risk Management	**SS-LSNE-1** Lie symmetry and other approaches in theory and applications of nonlinear equations	**SS-GLS** Geocomputational landscapes and spaces
12:30-13:00	**Conference Photo Shoot** *Meet in front of BA*				
13:00-14:00	**Lunch**				
14:00-15:00	**Plenary Talk** BA 201 - Chair: I. Kotsireas **Computer involvement in the classification of small index subfactors** **Vaughan Jones**Vanderbilt University - Abstract and Biography - p 9				
15:00-15:15	**Coffee Break** BA Hallways				
15:15-16:15	**Plenary Talk** BA 201 - Chair: J. Campolieti **Models, Mathematics, and Markets - Is the Intersection an Empy Set?** **Peter Carr** Morgan Stanley - Abstract and Biography - p 5				
16:15-16:30	**Coffee Break** BA Hallways				
16:30-18:30	**SS-SSMMBP-2** Simulations in soft matter and molecular Bio-Physics	**SS-HPTC-6** Recent progress in hyperbolic problems: Theory and Computation	**SS-MFMCR-2** Mathematical Finance - Modeling, Computation and Risk Management		**SS-EGT** Evolutionary Game Theory

Wednesday, August 28, 2013

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
09:00-10:00	**Plenary Talk** BA 201 - Chair: R. Melnik **Systemic Risk** **George Papanicolau** Stanford University - Abstract and Biography - p 12				
10:00-10:30	**Coffee Break**: BA Hallways				
10:30-12:30	**SS-CDPB-3** Complex Dynamics of Population Behaviour	**SS-NCTAP-3** New Computational Techniques for Applied Problems in Science and Engineering	**SS-RTDEDS-1** Recent trends in differential equations and dynamical systems	**CS-FINANCE-3** Financial Mathematics and Computation	**CS-BSM-2** Mathematics and Computation in Biological Sciences and Medicine
12:30-13:00	**Conference Photo Shoot** *Meet in front of BA*				
13:00-14:00	**Lunch**				
14:00-15:00	**Plenary Talk** BA 201 - Chair: I. Kotsireas **Computer involvement in the classification of small index subfactors** **Vaughan Jones** Vanderbilt University - Abstract and Biography - p 9				
15:00-15:15	**Coffee Break** BA Hallways				
15:15-16:15	**Plenary Talk** BA 201 - Chair: J. Campolieti **Models, Mathematics, and Markets - Is the Intersection an Empy Set?** **Peter Carr** Morgan Stanley - Abstract and Biography - p 5				
16:15-16:30	**Coffee Break** BA Hallways				
16:30-18:30	**SS-ME1** Mathematical Epidemiology	**SS-NCTAP-4** New Computational Techniques for Applied Problems in Science and Engineering	**SS-RTDEDS-2** Recent trends in differential equations and dynamical systems		**CS-BSM3** Mathematics and Computation in Biological Sciences and Medicine

8.4 Thursday, August 29, 2013

	Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
09:00-10:00	**Plenary Talk** BA 201 - Chair: P. Tieleman **Nanocomputations by DNA Self-Assembly** **Lila Kari** Western University - Abstract and Biography - p 10				
10:00-10:30	**Coffee Break & Poster Session***: BA 110 & 111				
10:30-12:30	**SS-SSMMBP-3** Simulations in soft matter and molecular Bio-Physics	**SS-SNDTA-1** Symmetry in Nonlinear Dynamics: Theory and Applications	**SS-MFMCR-3** Mathematical Finance - Modeling, Computation and Risk Management	**SS-SGT** Structured Graph Theory	**SS-CMS-1** Computational Materials Science
12:30-14:00	**Lunch**				
14:00-15:00	**Plenary Talk** BA 201 - Chair: M. Cojocaru **Optimization and Modeling in Energy Systems** **Panos Pardalos** University of Florida - Abstract and Biography - p 13				
15:00-15:30	**Coffee Break & Poster Session***: BA 110 & 111				
15:30-18:00	**SS-SSMMBP-4** Simulations in soft matter and molecular Bio-Physics	**SS-SNDTA-2** Symmetry in Nonlinear Dynamics: Theory and Applications	**CS-Meche1** Computational Mechanics and Engineering	**SS-LSNE-3** Lie symmetry and other approaches in theory and applications of nonlinear equations	**SS-CMS-2** Computational Materials Science
19:00-22:00	**Conference Banquet.** *details: section 2, map: section 10*				

** Posters will be on display in rooms BA 110 and BA 111 for the duration of the conference. Authors will be available for discussion during the Thursday Poster Sessions.*

Thursday, August 29, 2013

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211	Room BA305
09:00-10:00	**Plenary Talk** BA 201 - Chair: P. Tieleman **Nanocomputations by DNA Self-Assembly** **Lila Kari** Western University - Abstract and Biography - p 10					
10:00-10:30	**Coffee Break & Poster Session***: BA 110 & 111					
10:30-12:30	**SS-ME-2** Mathematical Epidemiology	**SS-WSM-1** Women in Science and Mathematics	**SS-HOMCFD1** High-Order Methods in Computational Fluid Dynamics	**SS-ANMPDE1** Advanced Numerical Methods for PDEs and Applications	**SS-ADS-1** Canada-China Session on Applied Dynamic Systems	**CS-AMPRE-1** Applied Problems and Methods in Research & Education
12:30-14:00	**Lunch**					
14:00-15:00	**Plenary Talk** BA 201 - Chair: M. Cojocaru **Optimization and Modeling in Energy Systems** **Panos Pardalos** University of Florida - Abstract and Biography - p 13					
15:00-15:30	**Coffee Break & Poster Session***: BA 110 & 111					
15:30-18:00	**SS-ME3** Mathematical Epidemiology	**SS-WSM2** Women in Science and Mathematics	**SS-HOMCFD2** High-Order Methods in Computational Fluid Dynamics	**SS-ANMPDE2** Advanced Numerical Methods for PDEs and Applications	**SS-ADS-2** Canada-China Session on Applied Dynamic Systems	**CS-AMPRE-2** Applied Problems and Methods in Research & Education
19:00-22:00	**Conference Banquet.** *details: section 2, map: section 10*					

** Posters will be on display in rooms BA 110 and BA 111 for the duration of the conference. Authors will be available for discussion during the Thursday Poster Sessions.*

8.5 Friday, August 30, 2013

	Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
09:00-10:00	**Plenary Talk** BA 201 - Chair: M. Cojocaru **Phylogenetic Analysis of the Musical Rhythms of the World** **Godfried Toussaint** NYUAD/M.I.T/McGill - Abstract and Biography - p 15				
10:00-10:30	**Coffee Break**: BA Hallways				
10:30-12:50	**SS-SSMMBP-5** Simulations in soft matter and molecular Bio-Physics	**SS-CFDRA-1** Computational Fluid Dynamics for Real Applications	**CS-MECHE2** Computational Mechanics and Engineering	**SS-MIPD-1** Mathematical Immunology and Pathogen Dynamics	**SS-IM** Industrial Mathematics
12:30-14:00	**Lunch**				
14:00-15:00	**Plenary Talk** BA 201 - Chair: M. Cojocaru **Patterns of Synchrony** **Marty Golubitsky** Ohio State University - Abstract and Biography - p 8				
15:00-15:30	**Coffee Break**: BA Hallways				
15:30-17:50	**SS-SSMMBP-6** Simulations in soft matter and molecular Bio-Physics	**SS-CFDRA2** Computational Fluid Dynamics for Real Applications		**SS-MIPD2** Mathematical Immunology and Pathogen Dynamics	**SS-SAEEM** Statistical Aspects of Environmental and Ecological Modeling
18:00-18:15	**Presentation of Student and Young Researcher Awards** *BA101*				

Friday, August 30, 2013

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211	Room BA305
09:00-10:00	**Plenary Talk** BA 201 - Chair: M. Cojocaru **Phylogenetic Analysis of the Musical Rhythms of the World** **Godfried Toussaint** NYUAD/M.I.T/McGill - Abstract and Biography - p 15					
10:00-10:30	**Coffee Break**: BA Hallways					
10:30-12:50	**CS-CPC-1** Computational Physics and Chemistry	**SS-MMNN** Mathematical Models for Nanoscience and Nanotechnology	**SS-QCTA-1** Quantum Control: Theory and Application -1	**SS-DBCNDE 1** Dynamics and bifurcations in coupled networks of differential equations: theory and applications	**SS-NMDAEA** Numerical methods for differential-algeraic equations and applications	
12:30-14:00	**Lunch**					
14:00-15:00	**Plenary Talk** BA 201 - Chair: M. Cojocaru **Patterns of Synchrony** **Marty Golubitsky** Ohio State University - Abstract and Biography - p 8					
15:00-15:30	**Coffee Break** BA Hallways					
15:30-17:50	**CS-CPC-2** Computational Physics and Chemistry	**SS-RPSETS-1** Recent progress in spintronics: Experiment, theory and simulation	**SS-QCTA-2** Quantum Control: Theory and Application -2	**SS-DBCNDE 2** Dynamics and bifurcations in coupled networks of differential equations: theory and applications	**SS-CMAIS** Control Methods for Advanced Industrial Systems	**SS-VPPO** Variational Problems of Physical Origin
18:00-18:15	**Presentation of Student and Young Researcher Awards** *BA101*					

9 Detailed Conference Schedule

9.1 Monday, August 26 – 10:30 - 12:30

Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
SS-AAIP-1 Applied Analysis and Inverse Problems - 1 **Session Chairs:** Herb Kunze University of Guelph	**SS-HPTC-1** Recent progress in hyperbolic problems: Theory and Computation - 1 **Session Chairs:** Tesdall, Allen CUNY College of Staten Island	**SS-DG-1&SCT-1** Decisions and Games - 1, Social Choice Theory - 1 **Session Chairs:** Marcus Pivato, Trent University	**SS-DFT-1** Density Functional Theory - 1 **Session Chairs:** Ian Hamilton, Paul Ayers , Viktor Staroverov Wilfrid Laurier University, McMaster University, Western	**SS-SDAG** Statistical Data Analysis and Geometry - 1 **Session Chairs:** Chenouri, Shoja University of Waterloo
10:30-10:50 #348 **Fourier Transforms of Measure-valued images,self-similarity and inverse problem** E.R.Vrscay University of Waterloo	10:30-10:50 #265 **Estimation and propagation of volcanic source parameter uncertainty and the Eyjafjallajökull plume** Patra, Abani University at Buffalo	10:30-10:50 #341 **When Does Approval Voting Make the Right Choices?** Kilgour, Marc Wilfrid Laurier University	10:30-11:30 #278 **Variational principles in wave-functional formulations of quantum mechanics** Levy, Mel (Semi-plenary, p 20) Duke University	10:30-10:50 #365 **Spanifold: Spanning Tree Flattening Onto Lower Dimension** Small, Christopher University of Waterloo
10:50-11:10 #409 **Denoising of hyperspectral images** D.Otero University of Waterloo	10:50-11:10 #563 **Exponential time integration methods for wave-dominated problems** Min, Misun Argonne National Laboratory	10:50-11:10 #41 **Implementation of Majority Voting Rules** Sean Horan Université du Québec á Montréal	11:30-11:50 #278 **A new DFT approach to polarizable force-fields** Verstraelen, Toon Ghent University	10:50-11:10 #369 **Computational Aspects of Inference in Local Mixture Models** Maroufy, Vahed University of Waterloo
11:10-11:30 #406 **Numerical solution of 3D vector tomography problem with usage of singular value decomposition** A.Polyakova Sobolev Institute of Mathematics SB RAS, Novosibirsk, Russia	11:10-11:30 #333 **Smoothness Increasing Accuracy Conserving (SIAC) filtering for discontinuous Galerkin approximations to nonlinear hyperbolic conservation laws** Ryan, Jennifer University of East Anglia	11:10-11:30 #620 **Geometric Analysis of Three-Claimant Dynamic Bankruptcy Rules** Jones, Michael, A. Mathematical Reviews, American Mathematical Societ	11:50-12:10 #141 **Accurate Bond Dissociation Curves at Mean-Field Computational Cost: Describing Strongly Correlated Systems with Nonorthogonal Geminals** Limacher, Peter McMaster University	11:10-11:30 #376 **The Application of the Convex Geometry in the Generalized Method of Moments for Mixture Models** Huang, Zhiyue University of Waterloo
11:30-11:50 #438 **B-Spline slice-by-slice solution of 3D vector tomography problem** I.Svetov IM SB RAS, Novosibirsk, Russia	11:30-11:50 #582 **Shock detection of discontinuous Galerkin methods using multiwavelets** Vuik, Thea Delft University of Technology	11:30-11:50 #192 **Comparing Mutually Naïve and Strategic Sequential Selection** Hopkins, Brian Saint Peter's University	12:10-12:30 #297 **Kohn-Sham model for heavy atoms** Melgaard, Michael University of Sussex	11:30-11:50#443 **Computing least squares condition numbers on hybrid multicore/GPU systems** Baboulin, Marc Inria and Université Paris-Sud, France
11:50-12:10 #438 **A novel image registration-reconstruction framework for real-time monitoring of paraspinal tumors in radiation therapy** D. Brunet Princess Margaret Hospital, University Health Network	11:50-12:10 #466 **Linear Stability Analysis of the Discontinuous Galerkin Method on Uniform and Nonuniform Grids** Qin, Ruibin University of Waterloo	11:50-12:10 #68 **The variable choice set logit model applied to the 2004 Canadian election** Gallego, Maria Wilfrid Laurier University		11:50-12:10 #456 **Robustness in dimensionality reduction** Liang, Jiaxi University of Waterloo
12:10-12:30 #174 **Regularization Approach for Abel Transform Based Image Reconstruction by a Single Radiograph** Wei, Su Hua Institute of Applied Physics and Computational Mathematics	12:10-12:30 #658 **Relaxing the CFL Number of the Discontinuous Galerkin Method** Krivodonova, Lilia University of Waterloo	12:10-12:30 #425 **Convergence rates for the distance-based inconsistencies in pairwise comparison is examined by Monte Carlo study** Koczkodaj, Waldemar W Laurentian University		12:10-12:30 #490 **Quantifying the Asymptotic Coverage Probabilities of Bootstrap Confidence Regions** Wang, Chunlin University of Waterloo

Monday, August 26 – 10:30 - 12:30

Room BA202	Room BA208	Room BA209	Room BA210	RoomBA211
CS-MODELING-1 Partial Differential and Integral Equations in Mathematical Modeling - 1 **Session Chairs:** Socolowsky, Jürgen Brandenburg University of Applied Sciences	**SS-MHP-1** Mathematics of human placenta: a window into fetal origins of adult disease - 1 **Session Chairs:** Salafia, C.M., Shlakhter, O., Yampolsky, M. Institute for Basic Research/Placental Analytics, Alberta Health Services, University of Toronto	**SS-MCMMBM-1** Modeling and Computational Methods for Mathematical Biology and Medicine - 1 **Session Chairs:** Shontz, Suzanne, Drapaca, Corina, Sivaloganathan, Siv Mississippi State, The Penn State University,Wilfrid Laurier University	**SS-MACBE-1** Modeling approaches and challenges in the built enviroment - 1 **Session Chairs:** Danks, Ryan, Carl, Michael RWDI,RWDI	**CS-DSDE-1** Applications of Dynamical Systems and Differential Equations - 1 **Session Chairs:** Selmane, Schehrazad USTHB
10:30-10:50 #105 **On a Two-Fluid Slot Coating Flow with Evaporation** Socolowsky, Jürgen Brandenburg University of Applied Sciences	10:30-10:50 #254 **Why placental shape matters: a research trajectory** Salafia, Carolyn Placental Analytics	10:30-10:50 #45 **A Study of Brain Biomechanics using Hamiltons Principle** Drapaca, Corina The Pennsylvania State University	10:30-10:50 #624 **Large Scale Modelling of Human Thermal Numerical Weather and Climate Prediction for Building Science** Phillips, Duncan Rowan, Williams, Davies, and Irwin Inc.	10:30-10:50 #35 **Analytical Integration of the Osculating Lagrange Planetary Equations in the Elliptic Orbital Motion** Hautesserres, Denis Centre National d'Etudes Spatiales
10:50-11:10 #100 **Global Existence and Blow-up of Solutions for a Class of Nonlinear Nonlocal Wave Equations** Babaoglu, Ceni Istanbul Technical University	10:50-11:10 #257 **Translating Measures of Placental Shape into Predictors of Infant and Childhood Healt** Misra, Dawn Wayne State University	10:50-11:10 #371 **Modeling and Pharmacokinetic Aspects for the Interaction between Beta Amyloid peptide and Choline Acetyltransferase and Acetylcholine Neurocycle and their relation to Alzheimers and Parkinsons Diseases** Mustafa, Ibrahim Ryerson University	10:50-11:10 #561 Large Scale Modeling of Human Thermal Comfort in the Urban Realm Danks, Ryan Rowan, Williams, Davies, and Irwin Inc.	10:50-11:10 #86 **Stability Analysis of a Human-Phlebotomus Papatasi-Rodent Epidemic Model** Selmane, Schehrazad USTHB
11:10-11:30 #300 **Coupled Heat Transport and Darcian Water Flow in Freezing Soils** Krupicka, Lukas Czech Technical University Prague	11:10-11:30 #255 **Is the placental disk really an ellipse?** Shlakhter, O. Alberta Health Services	11:10-11:30 #591 **Predicting nonlinearity of tumor spheroid growth in HGF media: a data-driven multi-species continuum model** Konstorum, Anna University of California Irvine	11:10-11:30 #581 **Energy Use Analysis at the Master Plan Level** Carl, Michael Rowan, Williams, Davies, and Irwin Inc.	11:10-11:30 #129 **Equivalence of the MTS Method and CMR Method for Delay Differential Equations** Yu, Pei University of Western Ontario
11:30-11:50 #240 **Symmetry classification of a generalized variable-coefficient Gardner equation** Bruzon, Maria S University of Cadiz	11:30-11:50 #137 **Optimal transport and placental function** Xia, Qinglan UC Davis	11:30-11:50 #536 **Effect of fluid friction in fluid flow simulation in solid tumors** Soltani, Madjid University of Waterloo	11:30-11:50 #590 **Modeling Building Stack Effect Using Network Model** Tang, Vincent Rowan, Williams, Davies, and Irwin Inc.	11:30-11:50 #145 **Retention of Eventual Stability of Invariant Sets of Impulsive Differential Systems** Sood, Anju Rayat Bahra College of Engineering and Nano technology for Women, Hoshiarpur
11:50 - 12:10 #299 **High Concentration Vesicle Suspensions** Quaife, Bryan University of Texas	11:50 - 12:10 # 105 **Modeling and analyzing the placental vasculature** Yampolsky, Michael University of Toronto	11:50 - 12:10 #315 **Calcium dynamics in dendritic spines: A link to structural plasticity** Dur-e-Ahmad, Muhammad Lahore University of Management Sciences	11:50 - 12:10 #585 **Numerical Computational Methods and Applications in Building Ventilation** Li, Eric Rowan, Williams, Davies, and Irwin Inc.	11:50 - 12:10 #147 **Scattering states of a particle, with position dependent mass, in a double heterojunction** Sinha, Anjana Jadavpur University
	12:10 - 12:30 **Discussion**	12:10 - 12:30 #482 **A Machine Learning Tool for Automated Image Segmentation** Shontz, Suzanne Mississippi State University		12:10 - 12:30 #154 **A new multi-stage spectral relaxation method for solving chaotic initial value systems** Dlamini, Phumlani University of Johannesburg, South Africa

9.2 Monday, August 26 – 15:30 - 17:30

Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
SS-AAIP-2 Applied Analysis and Inverse Problems - 2	**SS-HPTC-2** Recent progress in hyperbolic problems: Theory and Computation - 2	**SS-DG-2& SCT-2** Decisions and Games - 2, Social Choice Theory - 2	**SS-DFT-2** Density Functional Theory - 2	**SS-RWFDNO** Continuous-time random walks, fractional diffusion and non-local operators: Applications
Session Chairs: Herb Kunze University of Guelph	**Session Chairs:** Allen Tesdall CUNY College of Staten Island	**Session Chairs:** D. Marc Kilgour Wilfrid Laurier University	**Session Chairs:** Ian Hamilton, Paul Ayers, Viktor Staroverov Wilfrid Laurier University, McMaster University, Western Ontario	Meerschaert, M., Scalas, E. Michigan State University, University of Eastern Piedmont
15:30 - 15:50 #552 **On the application of Adjoint methods in subsurface flow simulations** L.Bush University of Wyoming	15:30-15:50 #566 **A Generalized Sign-Changing Liouville Equation** Saxton, Ralph University of New Orleans	15:30-16:30 #319 **Fair Division** Brams, Steven (Semi-plenary, p 17) New York University	15:30-15:50 #281 **Constrained 1DM Algorithm with Fractional Occupations** Chan, Matthew McMaster University	15:30-15:50 #79 **Correlation structure of fractional Pearson diffusions** Sikorskii, Alla Michigan State University
15:50 - 16:50 #17 **On an inverse and ill-posed of autoconvolution type in ultrashort laser.** Hofmann, Bernd (Semi-plenary, p 18) Chemnitz University of Technology, Department of Mathematics	15:50 - 16:10 #543 **Special Solutions in Smectic Electroconvection** Pugh, Mary University of Toronto	16:30 - 16:50#117 **Ranking Multidimensional Alternatives and Uncertain Prospects** Pivato, Marcus Trent University	15:50 - 16:10 #290 **Energy Decomposition Analysis with Occupation Constraints** Gonzlez Espinoza, Cristina Elizabeth McMaster University	15:50 - 16:10 #114 **CTRWModel for Fractional Wave Equations** Meerschaert, Mark M Michigan State University
16:50 - 17:10 #302 **Changes in habitat of fish population:an inverse problem** K.Levere University of Guelph	16:10 - 16:30 #514 **Effects of Nonstrict Hyperbolicity on Singularity Formation** Saxton, Katarzyna Loyola University, New Orleans	16:50 -17:10#246 **Degree of Difficulty: A fundamental Problem in Contest Design** Gerchak, Yigal Tel-Aviv University	16:10 - 16:30 #608 **Variational Hirshfeld Ensemble** Heidar Zadeh, Farnaz McMaster University	16:10 - 16:30 #136 **Continuous-time Random Walk from a Continuous Double Auction** Scalas, Enrico DISIT, Universita del Piemonte Orientale, Italy
	16:30 - 16:50 #96 **Fast Sweeping Methods for Steady State Problems for Hyperbolic Conservation Laws** Chou, Ching-Shan Ohio State University	17:10-17:30 #243 **Bargaining with Uncertain Commitment: On the Limits of Disagreement** Dutta, Rohan McGill University	16:30 - 16:50 #607 **Conceptual Density-Functional Theory Formulation of a General-Purpose Reactivity Indicator: Beyond the Classic Reactivity Paradigms** Anderson, James Peking University	16:30 - 16:50 #222 **Analysis for Nonlinear Equations Involving Space Fractional Diffusion** Schwab, Russell Michigan State University
	16:50-17:10#411 **Isentropic Flow with Large Data** Jenssen, Kris Penn State University		16:50-17:10 # 156 **Kohn-Sham effective potentials from density and correlated wavefunctions** Cuevas-Saavedra, Rogelio Western Ontario	16:50 - 17:10#248 **Numerically efficient stochastic solution of the space-time fractional diffusion equation through Monte Carlo simulation of continuous-time random walks** Germano, Guido Philipps-Universität Marburg
			17:10 - 17:30 #115 **Toward approximating the exchange-correlation potential by explicit modeling of the exchange-correlation charge distribution** Kohut, Sviataslau Western Ontario	17:10 - 17:30 #349 **Applications of Random Renormalization Group Operators** O'Malley, Daniel Purdue University

Monday, August 26 – 15:30 - 17:50

Room BA202 SS-CSB Computations in Systems Biology **Session Chairs:** Hin Hark Gan, Gaurav Arya NYU,UCSD	Room BA208 SS-MHP-2 Mathematics of human placenta: a window into fetal origins of adult disease - 2 **Session Chairs:** C.M. Salafia, O. Shlakhter, M. Yampolsky Placental Analytics, Alberta Health Services, University of Toronto	Room BA209 SS-MCMMBM-2 Modeling and Computational Methods for Mathematical Biology and Medicine - 2 **Session Chairs:** Suzanne Shontz, Drapaca, Corina, Sivaloganathan, Siv Mississippi State, Penn State,Wilfrid Laurier University	Room BA210 SS-MACBE-2 Modeling approaches and challenges in the built environment - 2 **Session Chairs:** Danks, Ryan, Carl , Michael RWDI,RWDI	RoomBA211 CS-DSDE-2 Applications of Dynamical Systems and Differential Equations - 2 **Session Chairs:** Ncube, Israel Memorial University of Newfoundland
15:30 - 15:50 #564 **Genome organisation influences cell type-specific transcriptional programs** Mitchell, Jennifer University of Toronto	15:30 - 15:50 # 256 **Human Placenta The Interface for Two Vascular Systems** Miller, Richard University of Rochester	15:30 - 15:50 #310 **Cluster Newton Method for Sampling Multiple Solutions of an Underdetermined Inverse Problem: Parameter Identification for Pharmacokinetics** De Sterck, Hans University of Waterloo	15:30 - 15:50 #05 **Analytical study of wave run-up generated by bottom motion on a non-uniformly sloping beach** Bandyopadhyay, Arghya Khalisani College, Chandannagar, India	15:30 - 15:50 #16 **Extension of Leighton's criteria to nonlinear dynamic equations of neutral type** Tripathy, Arun Kumar Sambalpur University
15:50 - 16:10 #262 **3-D Higher-Order Folded Chromosome Conformations From 2-D Interaction Frequency Maps** Arya, Gaurav University of California,San Diego	15:50 - 16:10 # 249 **Efficient methods for detecting low-rank substructure** Rangan, Aadytia NYU	15:50 - 16:10 #176 **The mechanism underlying the therapeutic effects of Vitamin C against cancer, at pharmacological concentrations** Molavian, Hamid University of Waterloo	15:50 - 16:10 #52 **A Cantor Set Model of Earthquake Dynamics in Aftershock Sequences** Kamal, Kamal Indian Institute of Technology Roorkee	15:50 - 16:10 #380 **Nutrient transport through heterogeneous soil medium** Kumar, Atul University of Lucknow, India
16:10 - 16:30 #303 **Evidence of Evolutionary Couplings in Chlamydomonas Metabolic Network** Salehi-Ashtiani, Kourosh NYU Abu Dubai	16:10 - 16:30 #199 **Metabolic Scaling Law for Mouse Fetal and Placental Weight** Gasperowicz, Malgorzata University of Calgary	16:10 - 16:30 #151 **The Effects of Body Fluid on Cheyne-Stokes Respiration** Willms, Allan University of Guelph	16:10 - 16:30 #101 **Applicability of a Diffusion Model for Cosmic Ray Transport during Large Forbush Decrease Events** Kalugin, German Natural Resources Canada	16:10 - 16:30 #382 **Stability in a distributed delay differential equation** Ncube, Israel Memorial University of Newfoundland
16:30-16:50 #460 **Translational Systems Biology: understanding the limits of animal models as predictors of human biology** Rhrissorrakrai, Kahn IBM	16:30-16:50 # 107 **Modeling Oxygen Transport in the Inter-Villous Space of the Human Placenta** Grebenkov, Denis Laboratory of Condensed Matter Physics, CNRS - Ecole Polytechnique	16:30-16:50 #143 **Modeling Cell-Sheets Wound Closure** Habbal, Abderrahmane University Nice Sophia Antipolis and INRIA	16:30-16:50 #121 **Minimum Stack Height for Micro Aerosols Air Pollution** Malek, Alaeddin Tarbiat Modares University	16:30-16:50 #396 **Control of the Landau–Lifshitz Equation** Chow, Amenda University of Waterloo
16:50-17:10 #503 **Accelerated molecular dynamics simulations and community network analysis reveal allosteric signaling pathways in a lectin-binding chaperone Calreticulin** Arora, Kaurnesh University of Michigan	16:50-17:10 #449 **Human Placenta The Interface for Two Vascular Systems** Salafia, Carolyn Placental Analytics	16:50-17:10 #472 **Weakly compressible tube flow with radially dependent viscosity and Navier slip at the wall** Regmi, Laxmi Ryerson University	16:50-17:10 #313 **An Input-Output Analysis Approach in Waste of Electrical and Electronic Equipments** Ulukan, Ziya Galatasaray University	16:50-17:10 #402 **Feedback Stabilization of Impulsive Underactuated Mechanical Systems by Using Lyapunov Constraints** Chaalal, Mohammed Houari Boumediene University of Sciences and Technology
17:10-17:30 #370 **Investigating Oscillatory Phenomena in the Continuous Bioreactor for Production of Bioethanol Using Zymomonas Mobilis** Mustafa, Ibrahim Ryerson University	17:10-17:30 **Discussion**	17:10-17:30 #481 **Myelosuppression and cytokine interaction in a mathematical model of the human hematopoietic system** Bélair, Jacques Université de Montréal		17:10-17:30 #586 **Activity Recognition for Remote and Self-monitoring using Android Smartphones** Kamal, Ankit University of Waterloo
17:30 - 17:50 # 362 **Mechanics of microRNA-mediated translational regulation** Gan, Hin Hark NYU				

9.3 Tuesday August 27–10:30 - 12:30

Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
SS-AAIP-3 Applied Analysis and Inverse Problems-1 **Session Chairs:** Kimberly Levere University of Guelph	**SS-HPTC-3** Recent progress in hyperbolic problems: Theory and Computation-1 **Session Chairs:** Lilia Krivodonova University of Waterloo	**SS-DG&SCT-3** Decisions and Games & Social Choice Theory-1 **Session Chairs:** Marcus Pivato Trent University	**CS-CACO-1** Computational Algebra, Combinatorics and Optimization **Session Chairs:** Aghayan Reza Kingston University, London	**SS-MSEPSW-1** Multitaper Spectrum Estimation, Prolate Spheroidal Wave Functions, Quadratic-Inverse, and Related Problems **Session Chairs:** W. Burr, C. Haley, D.J. Thomson Queen's University
10:30-10:50 #49 **Designing a search grid for parameter estimation using sensitivity analysis.** Van der Weeën, Pieter Ghent University	10:30-10:50 #81 **High Order Limiters for Hyperbolic Equations** Berzins, Martin University of Utah	10:30-10:50 #317 **Condorcet VS Borda, round $n+1$** Zwicker, William S. Union College	10:30-10:50 #88 **Highly Accurate Solution of Ordinary Diferential Equation with Singularity Arising in Fluid Dynamics** Pratibha, Pratibha Indian Institute of Technology Roorkee	10:30-10:50 # 493 **Signal and Spectral Estimation on a Sphere** Plattner, A. Princeton University
10:50-11:10 #468 **Parameter state range for ODE models using monotonic linear multistep discretizations** Skelton Andrew University of Guelph	10:50-11:10 #432 **A Fourth-Order Solution-Adaptive CENO Scheme for Three-Dimensional Multi-Block Cubed-Sphere Grids** Ivan, Lucian University of Waterloo	10:50-11:10 #194 **Analogy in decision making** Amarante, Massimiliano Université de Montréal	10:50-11:10 #171 **New Approach for solving the Linear Assignment Problem** Gningue, Youssou Laurentian University, Sudbury, Canada	10:50-11:10 #417 **Estimating evoked brain connectivity with discrete prolate spheroidal stimulation** Lepage, Kyle Boston University
11:10-11:30 #488 **The inverse problem of Fractal Potential Flows** Vass, Józef University of Waterloo	11:10-11:30 #109 **The design of a class of positivity preserving high order Lagrangian schemes for multi-material compressible flow** Cheng, Juan Institute of Applied Physics and Computational Mathematics	11:10-11:30 #193 **Enumeration and Connections for Extensive-Form Games** Hopkins, Brian Saint Peter's University	11:10-11:30 #209 **Nondeterministic relational fuzzy operators** Tchier, Fairouz King Saud University	11:10-11:30 #414 **Discrete Prolate Spheroidal Sequences as Filters in Generalized Additive Models** Burr, Wesley Queen's University
11:30-11:50 #568 **The Monge-Kantorovich metric in application** Mendivil, Franklin Acadia University	11:30-11:50#528 **A numerical investigation into high-order multiderivative integrators for hyperbolic conservation laws** Seal, David Michigan State University	11:30-11:50 #577 **Fast Equilibrium Computation for Infinitely Repeated Games** Andersen, Garrett Duke University	11:30-11:50 #292 **Bias, Noise, and Indeterminacy Correction in Numerically Invariant Signatures** Aghayan, Reza Kingston University London	11:30-11:50 #470 **Spectral Coherence Evidence for Oceanic Control of Interannual Carbon Cycle Feedbacks** Park, Jeffery Yale University
11:50-12:10 #359 **Inverse problems for delay differential equations using the Collage Theorem** Yodzis, Michael University of Guelph	11:50-12:10 #655 **Glancing weak Mach reflection** Tesdall, Allen CUNY College of Staten Island	11:50-12:10 #215 **Selfish driving behaviour and its effects on highway traffic** Nguyen, Sylvia University of Guelph	11:50-12:10 #418 **Design and Application of Fault-Tolerant Circulant Digraph Networks** Farrag, A. Dalhousie University	11:50-12:10 #500 **Localized Band-Limited Representation and Robust Interpolative Image Manipulation** Xiao, H. UC Davis
12:10-12:30#571 **Gravitational wave parameter estimation with compressed likelihood evaluations** Field, Scott University of Maryland	#284 **Hyperbolic Descriptions of Viscous Heat-Conducting Gaseous Flows and Their Solution** Groth, Clinton University of Toronto	12:10-12:30 #123 **On the existence of Berge equilibrium with pseudocontinuous payoffs** Deghdak, Messaoud W Universitè Mentouri, Constantine, Algeria	12:10-12:30 #351 **Solving the simple Transportation Problem by using the Modified Vogel Approximation method** Gningue, Youssou Laurentian University, Sudbury, Canada	12:10-12:30 #572 **Paleoclimate time scale estimation using multitaper spectral methods** Hinnov, Linda Johns Hopkins University

Tuesday, August 27 – 10:30 - 12:30

Room BA202	Room BA208	Room BA209	Room BA210
SS-CDPB-1	**SS-NCTAP-1**	**SS-CPH**	**CS-FINANCE-1**
Complex Dynamics of Population Behaviour - 1	New Computational Techniques for Applied Problems in Science and Engineering - 1	Computational Photonics	Financial Mathematics and Computation - 1
Session Chairs: Stephen Tully, Scott Greenhalgh, Chad Wells, Chris Pagnutti	**Session Chairs:** Ludwig Kohaupt, Yan Wu	**Session Chairs:** Marek Wartak, Harry E. Ruda	**Session Chairs:** Pirvu , Traian
Guelph,Yale, Yale, Guelph	Beuth University of Technology Berlin,Georgia Southern University	Wilfrid Laurier University,University of Toronto	McMaster University
10:30-10:50 #473 **Modelling Awareness and Adoption: Aggregate Behaviour versus Agent-Based Interactions with Network Effects** Erin Wild University of Guelph	10:30-10:50 # 474 **Solving a Large Scale Thermal Radiation Problem Using an Interoperable Executive Library Framework on Petascale Supercomputers** Wong, Kwai University of Tennessee	10:30-10:50 #10 **Mathematical and Computational Modeling of Noise Characteristics of Channel Amplifiers** Shymanska, Alla Auckland University	10:30-10:50 #63 **Utility Indifference Pricing: A Time Consistent Approach** Pirvu, Traian McMaster University
10:50-11:10 #301 **Coevolution of risk perception, sexual behaviour, and HIV transmission in an agent-based model** Stephen Tully University of Guelph	10:50-11:10 # 36 **On the vibration-suppression property and monotonicity behavior of a special weighted norm for dynamical systems $\dot{x}$ = Ax, x(t0) = x0** Kohaupt, Ludwig Beuth University of Technology Berlin	10:50-11:10 #205 **On the numerical solution of chromatographic separation models** Tuomela, Jukka University of Eastern Finland	10:50-11:10 #113 **A Monte Carlo Measure to Improve Fairness in Equity Analyst Evaluation** Yaros, John Rutgers University
11:10-11:30 #94 **Agent-Based Modeling of Emotional Communications in Online Social Networks:The Role of Offline Processes in Online Bursting Events** Bosiljka Tadic Jozef Stefan Institute	11:10-11:30 #228 **Structure-Preserving Simulation of Mechanical Systems** Ball, Kenneth North Carolina State University	11:10-11:30 #283 **Predicting Optimal Finite Field Strengths Leading to Most Precise Calculations of Nonlinear Optical Properties** Mohammed, Ahmed McMaster University	11:10-11:30 #172 **Investigating the Market Price of Volatility Risk for Options in a Regime-Switching Market** Mielkie, Melissa University of Western Ontario
11:30-11:50 #596 **Equation-based and Agent-based models of adoption behaviour in multi-dimensional characteristics space** Monica Cojocaru University of Guelph	11:30-11:50#559 **Solution of Wiener-Hopf and Fredholm integral equations by fast Hilbert and Fourier transforms** Germano, Guido Philipps-Universität Marburg	11:30-11:50 #451 **Near and Far Fields in High Quality Resonances of a Periodic Grating** Byelobrov, Volodymyr IRE NASU	11:30-11:50 #218 **Pricing exotic options under the time-changed Brownian motion model by variance reduction and quasi-Monte Carlo methods** Tan, Qiuzi Wilfrid Laurier University
11:50-12:10 #515 **Outcome inelasticity and outcome variability in behavior-incidence models: an example from an SEIR infection on a dynamic network** Bryce Morsky University of Guelph	11:50-12:10 #578 **Interactive computational search strategy of periodic solutions in an essentially nonlinear dynamics** Kaushik, Aditya Panjab University, Chandigarh	11:50-12:10 #551 **Iterative analytic approximation to nonlinear convection dominated systems** Guclu, Yaman Michigan State University	11:50-12:10 #220 **Pricing and Hedging Index Options with a Dominant Constituent Stock** Cheyne, Helen University of Western Ontario
12:10-12:30#324 **Chaos in an unforced Malaria Model** Miranda Teboh-Ewungkem Lafayette College		12:10-12:30# ... **TBA** Bradley, Jonathan Wilfrid Laurier University	12:10-12:30 #269 **Robust Second-order least-squares estimation for regression with autocorrelated error: application of FMW and Generalized M-Estimates based methods** Rosadi, Dedi Gadjah Mada University

Tuesday, August 27 – 10:30 - 12:30

Room BA211	Room BA305
CS-DSDE-3	**CS-MODELING-2**
Applications of Dynamical Systems and Differential Equations - 3	Partial Differential and Integral Equations in Mathematical Modeling - 2
Session Chair:	**Session Chair:**
Selmane, Schehrazad	Pirvu, Traian
USTHB	McMaster University
10:30-10:50 #480	10:30-10:50 #355
Spectral approach in a 2D variational formulation for swirling flows in ducts with variable radius	**On Optimal Vortex Structures for Palinstrophy Generation**
Dragomirescu Ioana	Ayala, Diego
Politechnique University Timisoara	McMaster University
10:50-11:10 #496	10:50-11:10 #358
Dynamics of a modified Leslie-Gower predator-prey model with Crowley-Martin functional responses and stochastic perturbations	**Numerical simulation of potential Maxwell's equations in harmonic regime**
Ali, Namaat	Ortegón, Francisco G.
MIA, University La Rochelle	University of Cadiz
11:10-11:30 #638	11:10-11:30 #394
Chaotic flow in single phase natural circulation loops	**Kinetic and Material Property Effects on Fingering Instability in Reverse Smoldering Combustion**
Ardaneh, Kazem	Ijioma, Ekeoma Rowland
University of Tsukuba, Japan	Meiji Institute of Advanced Mathematical Sciences
11:30-11:50 #610	11:30-11:50 #439
Hybrid Fixed Point Theorem For Abstract Measure Delay Integro-Differential Equations	**A free boundary approach to solve the equilibrium equations of a membrane**
Bellalle Sidheshwar	Viglialoro, Giuseppe
Dayanand Science College, Latur	University of Cadiz
11:50-12:10 #615	11:50-12:10 #453
Triple positive solutions of m point p -Laplacian boundary value problem involving the derivative on time scales	**Bounds on dispersion tensor in periodic media**
Dogan, Abdulkadir	Smaranda, Loredana
Abdullah Gul University	University of Pitesti
12:10-12:30 #663	12:10-12:30 #539
Replicator dynamics vs. agent-based models of Axelrod's norms game	**A Mathematical Cellular Potts Model for Growth and Migration of Endothelial Cells**
Monica Gabriela Cojocaru	Soltani, Madjid
University of Guelph	University of Waterloo

9.4 Tuesday, August 27 – 15:30 - 17:30

Room BA101	Room BA102	Room BA111	Room BA112
SS-AAIP-4 Applied Analysis and Inverse Problems - 4	**SS-HPTC-4** Recent progress in hyperbolic problems: Theory and Computation - 4	**SS-DFT-3** Density Functional Theory - 3	**SS-MSEPSW-2** Multitaper Spectrum Estimation, Prolate Spheroidal Wave Functions, Quadratic-Inverse, and Related Problems - 2
Session Chairs: Kimberly Levere University of Guelph	**Session Chairs:** Lilia Krivodonova University of Waterloo	**Session Chairs:** Ian Hamilton, Paul Ayers , Viktor Staroverov Wilfrid Laurier University, McMaster University, Western Ontario	**Session Chairs:** W. Burr, C. Haley, D.J. Thomson Queen's University
15:30-15:50 #182 **Iterative Techniques for Nonlinear Periodic Boundary Value Problems via Initial value problem** Dezern, David Winston-Salem State University	15:30-15:50 #69 **Compressible Navier-Stokes equations with temperature dependent dissipation** Pan, Ronghua Georgia Institute of Technology	15:30-15:50 #170 **Free energies of adsorption and activation energies for organo-arsenicals at the liquid/solid interface a computational study.** Adamescu, Adrian University of Waterloo	15:30-15:50#611 **Multitaper Smoothed Minimum Statistics Noise Power Estimation** Castellanos, R. Florida Atlantic University
15:50-16:10 #452 The Scientific Way to Simulate Pattern Formation in Reaction-Diffusion Equations Cleary, Erin University of Guelph	15:50-16:10 #106 **Conservation Laws with no Classical Riemann Solutions: Existence of Singular Shocks** Tsikkou, Charis Department of Mathematics, West Virginia University	15:50-16:10 #102 **A density functional theory of hydrogen transfer for short-chain alkane thiols on small cationic, anionic, and neutral gold clusters** Smith, Silvija Wilfrid Laurier University	15:50-16:10 #545 **Multitaper Spectrum Estimation and Quadratic-Inverse Theory: from Conception to Present** Thomson, David Queen's University
16:10-16:30 #155 **Regularizing a Volterra integral equation of the first kind** Subbey, Sam Institute for Marine Research, Norway	16:10-16:30 #423 **Normal forms and a Burgers-Hilbert equation** Hunter, John University of California at Davis	16:10-16:30# 188 **Computational Chemistry Studies On Atmospherically-Relevant Organic Complexes With Iron** Jones, Glynis Wilfrid Laurier University	16:10-16:30 #230 **Analysis of Multitaper Covariance and Autoregressive Spectral Estimates** Erdol, Nurgun Florida Atlantic University
16:30-16:50 #360 **On set-valued nonlinear Fredholm integral equations** Kunze, Herb University of Guelph	16:30-16:50#280 **Two-dimensional Riemann problems for conservation laws and shock reflection** Jegdic, Katarina University of Houston - Downtown	16:30-16:50 #229 **Accurate ab initio spin densities** Boguslawski, Katharina ETH Zurich	16:30-16:50 #422 **Jackknifing Multitaper Autocorrelation Estimate** Haley, Charlotte Queen's University
16:50-17:10	16:50-17:10 #640 **Recent Progress Towards Periodic Solutions of the Euler Equations** Young, Robin University of Massachusetts, Amherst	16:50-17:10 #233 **Towards reliable modeling of excited states of actindes from (relativistic) time-dependent density functional theory** Tecmer, Pawel McMaster University	16:50-17:10

Tuesday, August 27 – 15:30 - 17:30

Room BA202	Room BA208	Room BA210	RoomBA211	Room BA305
SS-CDPB-2 Complex Dynamics of Population Behaviour - 2 **Session Chairs:** Stephen Tully, Scott Greenhalgh, Chad Wells, Chris Pagnutti Guelph,Yale, Yale, Guelph	**SS-NCTAP-2** New Computational Techniques for Applied Problems in Science and Engineering - 2 **Session Chairs:** Ludwig Kohaupt, Yan Wu Beuth University of Technology Berlin,Georgia Southern University	**CS-FINANCE-2** Financial Mathematics and Computation - 2 **Session Chairs:** Pirvu, Traian McMaster University	**CS-BSM-1** Mathematics and Computation in Biological Sciences and Medicine - 1 **Session Chairs:** Nikolaev, Alexei The Graduate Center, CUNY	**CS-MODELING-3** Partial Differential and Integral Equations in Mathematical Modeling - 3 **Session Chairs** Socolowsky, J. Brandenburg University of Applied Sciences
15:30-15:50 #311 **Adaptation and parasite virulence in an increasingly connected world** Wild, Geoff University of Western Ontario	15:30-15:50 #150 **Discretization of Fractional Order Differentiator Over Paley-Wiener Space** Wu, Yan Georgia Southern University	15:30-15:50 #384 **Valuation of the Peterborough Prison Bond** Hasan, Majid Western University,	15:30-15:50#19 **Effect of boundary absorption on dispersion of solute in a pulsatile Casson fluid flow** Thomas-Sebastian, Binil University of West Indies	15:30-15:50# 609 **Mixed problems for the Telegraph Equation in the Case of a System Consisting of N Segments with different Densities and Elasticities but Equal Impedances** Smirnov,Ilyas Lomonosov Moscow State University
15:50-16:50 #600 **Ecological and Epidemiological Drivers of Viral Evolution** Klein, Eili (Semi-plenary, p 19) Johns Hopkins University	15:50-16:50 #631 **Boundary Conditions for Constrained Hyperbolic Systems: Mathematical and Numerical Analysis** Tarfulea, Nicolae (Semi-plenary, p 22) Purdue University Calumet	15:50-16:10 #371 **Basket Option Pricing with Levy Processes using Mellin Transforms** Manuge, Derek University of Guelph	15:50-16:10 #270 **A Note on Malthus parameter-Dependent Conservation Law in Population Dynamics** Obabyi, Olawale Sunday University of Ibadan	15:50-16:10 #541 **Symbolic-Numerical Methods for some Special Functions Involved in Groundwater Hydrodynamics** Bagayogo A.Bass University of Saint-Boniface
16:50-17:10 #234 **The evolution of competitive helping within biological markets** Barclay, Pat University of Guelph	16:50-17:10 #159 **Matrices of Green's Type for Sets of Laplace Equations Posed on Joint Surfaces of Revolution Weakened with Apertures** Borodin, Volodymyr Middle Tennessee State University	16:10-16:30 #413 **Simulation of Greeks of multiasset options under exponential subordinated Brownian motion models by Malliavin calculus and quasi-Monte Carlo methods** Tan, Qiuzi Wilfrid Laurier University	16:10-16:30 #126 **Nonlinear Robust Control and Regulation problems for Biomedical Dynamical Systems** Belmiloudi, Aziz IRMAR-INSA of Rennes	16:10-16:30 # 477 **Convergence of the Lagrange-Galerkin method for the equations modelling of fish-like swimming** Smaranda, Loredana University of Pitesti
17:10 -17:30#179 **Outlook on a global forest transition** Pagnutti, Chris University of Guelph		16:30-16:50 #567 **Fast pricing of discretely monitored exotic options using the Spitzer identity and Wiener-Hopf factorization** Germano, Guido Philipps-Universitat Marburg	16:30-16:50 #186 **Optimal Control of Bioheat Equation using Semigroups** Malek, Alaeddin Tarbiat Modares University	16:30-16:50 #21 **Modelling, Simulation and Optimization of Gas Flow in an Exhaust Pipe** Rybicki, Martin University of Hamburg
		16:50-17:10 #639 **CVaR Robust Mean-CVaR Portfolio Optimization** Salahi, Maziar University of Guilan	16:50-17:10#237 **A Model of Clusters in Binary and Ternary Strings Applied to Protein Secondary Structure Prediction** Nikolaev, Alexey The Graduate Center, CUNY	
		17:10-17:30 #169 **Climate Change and Heavy Rainfall-related Water Damage Insurance Claims and Losses in Ontario, Canada** Cheng, Chad Shouquan Environment Canada		

9.5 Wednesday, August 28 – 10:30 - 12:30

Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
SS-SSMMBP-1 Simulations in soft matter and molecular Bio-Physics - 1 **Session Chairs:** Trang Do University of Waterloo	**SS-HPTC-5** Recent progress in hyperbolic problems: Theory and Computation - 5 **Session Chairs:** Jae-Hun Jung SUNY at Buffalo	**SS-MFMCR-1** Mathematical Finance Modelling, Computation and Risk Management - 1 **Session Chairs:** Joe Campolieti, Adam Metzler Wilfrid Laurier University	**SS-LSNE-1** Lie symmetry and other approaches in theory and applicatios of nonlinear equations - 1 **Session Chairs:** C.M.Khalique, M.Abudaib NorthWest University,RSA, Texas A&M University	**SS-GLS** Geocomputational landscapes and spaces Session Chairs: Steven A.Roberts, Colin Robertson Wilfrid Laurier University
10:30-10:50 #323 **Using hybrid molecular dynamics-lattice Boltzmann simulations to study polymers and porous particles in confined environments** Denniston,Colin University of Western Ontario	10:30-10:50 #334 **We establish local well-posedness in Sobolev spaces, and almost global solutions for small localized data for in infinite bottom water wave equation in 2D.** Ifrim, Mihaela McMaster University	10:30-10:50 #266 **Interconnected Balance Sheets, Market Liquidity, and the Ampification Effect in a Financial System** Chen, Nan The Chinese University of Hong Kong	10:30-10:50 #60 **Exact Solutions of a (3+1)-dimensional B-type Kadometsev-Petviashvili Equation** Abudiab,Mufid Texas A&M University-Corpus Christi	10:50-11:10#499 **Evolutionary Multi-objective Optimization Design for Peri-urban Greenlands Systems: metric implementations** Roberts, Steven Wilfrid Laurier University
10:50-11:10 #429 **Coarse-Grained Atomistic Modeling of Colloid Crystallization and Glass Formation with Phase Field Crystal Methods** Berry,Joel McMaster University	10:50-11:10 #367 **Absorbing boundary conditions for quantum relativistic mechanics** Lorin, Emmanuel Carleton University	10:50-11:10 #538 **Illiquidity and Insolvency: a Double Cascade Model of Financial Crises** Hurd, Tom McMaster University	10:50-11:10 #457 **Symmetry analysis and exact solutions of semilinear Schrodinger equations** Anco, Stephen Brock University	10:50-11:10#407 **Reducing Objectives in Many-Objective Optimization Problems for Landscape Design** Cruz Cortes, Nareli Instituto Politecnico Nacional (CIC-IPN)
11:10-11:30 #489 **Colloidal Particles Interacting in a Cholesteric Liquid Crystal** Mackay, Frances University of Western Ontario	11:10-11:30 #475 **An Efficient Implicit Boundary Integral Solver for the Vlasov-Maxwell System** Causley, Matthew Michigan State University	11:10-11:30 #120 **Trends and trades** Hadjiliadis, Olympia Brooklyn College	11:10-11:30 #196 **Symmetry reductions and exact solutions of a generalized Fisher equation** Gandarias,Maria Luz University of Cadiz	11:10-11:30#547 **Map Comparisons and Model Checking: A Comparative Analysis** Robertson,Colin Wilfrid Laurier University
11:30-11:50 #321 **Phase Field Crystal Modelling of Magneto-Elastic Effects in Isotropic Ferromagnetic Solids** Faghihi, Niloufar McGill University	11:30-11:50 #183 **Nonlinear wave interaction for the ultra-relativistic Euler equations** Abdelrahman, Mahmoud Otto-von-Guericke, Magdeburg, Germany	11:30-11:50 #616 **Stochastic correlation in financial markets** Seco, Luis University of Toronto	11:30-11:50 #272 **The effects of the singular lines in nonlinear wave equations** Zhang,Lijun Zhejiang Sci-Tech University	11:30-11:50#574 **LSP-GIS Method for Urban Land Suitability Decision-Making** Dragicevic, Suzana Simon Fraser University
11:50-12:10 #327 **Colloidal disks in nematic liquid crystals under the action of magnetic fields** Antipova, Alena University of Western Ontario	11:50-12:10 #588 **On the solution of dispersive evolution equations with discontinuous data** Biondini, Gino State University of New York at Buffalo	11:50-12:10 #175 **Explosive behavior in a lognormal interest rate model** Pirjol, Dan JPM	11:50-12:10 #291 **Power geometry for a reversible system of ordinary differential equations** Soleev, Akhmadjon Samarkand State University, Uzbekistan	11:50-12:10#581 **Comparing Interpolation Techniques for Predicting Rainfall in Tropical Climates** Plouffe, Cameron Wilfrid Laurier University
12:10-12:30 #522 **Pattern non-pattern transition for a nonlocal population dynamics** Oliveira, Fernando University of Brasilia		12:10-12:30 #524 **Hedging Bond Returns with Equity** Costanzino, Nick Scotiabank	12:10- 12:30 #308 **Application of Homotopy Perturbation Method with an Auxiliary Term for Nonlinear Dropping Equations Arisen In Packaging System** Wang, Jun Jiangnan University,China	12:10-12:30#424 **Approximations to Intractable Spatial Econometric Models and Their Solutions Through Global Optimization** Wachowiak-Smolikova, Renata Nipissing University

Wednesday, August 28 – 10:30 - 12:30

Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
SS-CDPB-3 Complex Dynamics of Population Behaviour **Session Chairs:** Stephen Tully, Scott Greenhalgh, Chad Wells, Chris Pagnutti Guelph, Yale, Yale, Guelph	**SS-NCTAP-3** New Computational Techniques for Applied Problems in Science and Engineering **Session Chairs:** Ludwig Kohaupt, Yan Wu Beuth University of Technology Berlin, Georgia Southern University	**SS-RTDEDS-1** Recent trends in differential equations and dynamical systems **Session Chairs:** Xinzhi Liu, Mohamad Alwan, Hongtao Zhang Univeristy of Waterloo	**CS-FINANCE-3** Financial Mathematics and Computation **Session Chairs:** Pirvu, Traian McMaster University	**CS-BSM-2** Mathematics and Computation in Biological Sciences and Medicine **Session Chairs:** Blahut, Kenneth Ryerson University
10:30-10:50 #80 **Incentives' Effect in Influenza Vaccination Policy** C. Yamin, Dan Yale University	10:30-10:50 #529 **Nonconforming Generalized Finite Element Method for Linear Parabolic Interface Problems** Tarfulea, Nicolae Purdue University Calumet	10:30-10:50 #16 **Orthogonal separation of variables in spaces of constant curvature** R. Smirnov Dalhousie University	10:30-10:50 #195 **Parametric Estimation of Stationary Stochastic Process under indirect Observability** Ren,Peng University of Huston	10:30-10:50#372 **Modeling and Simulation for the Effect of Beta Aggregates on Acetylcholine Neurocycle through Choline Leakage Hypothesis** Awad, Asmaa University of Waterloo
10:50-11:10 #127 **Policy resistance undermines superspreader vaccination strategies for influenza** Wells,Chad Yale University	10:50-11:10 #304 **Integration of Inventory Decisions and Supplier Selection to Optimum Design of Cellular Manufactruing Systems: A Stochastic Solution Space** Ghezavati, Vahidreza I.A.U. South Tehran Branch	10:50-11:10 #84 **Power geometry for a reversible system of ordinary differential equations** Soleev, Akhmadjon Samarkand State University	10:50-11:10 #276 **American option pricing under time-changed Brownian motion models** Tse, Long Yiu Wilfrid Laurier University	10:50-11:10 #273 **Modeling Blood Flow in a Brain Tumor Treated Concurrently with Radiotherapy and Chemotherapy** Roy, Ranadhir University of Texas-Pan American
11:10-11:30 #350 **A new multi-strain dynamic influenza model** Thommes, Edward University of Guelph & GSK Canada	11:10-11:30 #542 **Simulation of a Tumor Growth Model Based on an Adaptive Markov Chain Monte Carlo (AMCMC) Method** Wang, Qing Shepherd University,USA	11:10-11:30 #103 **Higher order functional boundary value problems via the lower and upper solutions method - applications** Fialho, Joao College of the Bahamas	11:10-11:30 #502 **Optimal Annuitization Timing With Stochastic Interest Rates** Wang, Jinlian York University	
11:30-11:50 #268 **The effects of vaccination preferences and perceived risk on the spread of influenza** Greenhalgh, Scott Yale University	11:30-11:50 #157 **Exploring Stochasticity and Imprecise Knowledge Based on Linear Inequality Constraints** Subbey, Sam Institute for Marine Research, Norway	11:30-11:50 #152 **A class of reaction-diffusion systems with mixed initial conditions** Rosu, Daniela "G. Asachi" Technical University, Iasi, Romania	11:30-11:50 #643 **Weather Derivatives and Applications in Canadian Data** Cui, Kaijie University of Calgary	11:30-11:50 #465 **Backward Bifurcation in a CTMC based model for the Transmittion Dynamics of Dengue Fever** Khan, Adnan Lahore University of Management Sciences
11:50-12:10 #516 **Modelling homophilic imitation with replicator equations** Morsky, Bryce University of Guelph	11:50-12:10 #44 **Numerical Algorithm to Solve Two-Point Non-Linear Singularly Perturbed Boundary Value Problems Using Initial Value Technique** Tiwari, Surabhi Motilal Nehru National Institute of Technology, Allahabad	11:50-12:10 #153 **Viability for a time-dependent domain with respect to a reaction-diffusion system with delay** Burlica, Monica-Dana "G. Asachi" Technical University, Iasi, Romania		11:50-12:10 #510 **A spatial computer model for the spread of hepatitis C virus infection in vitro** Blahut, Kenneth Ryerson University
12:10-12:30	12:10-12:30 # 421 **Random but visually nice shapes are used for Monte Carlo study of the area estimation Improvement by pairwise comparisons** Grant, Duncan Laurentian University	12:10-12:30 #239 **An Explicit Recursive Formula for Computing the Normal Form and Center Manifold of n-dimensional Differential Systems Associated with Semisimple Cases** Tian, Yun Western University		12:10-12:30 #530 **Non-Linearity and Heterogeneity in Modeling of Population Dynamics** Karev, Georgity NCBI, NIH

9.6 Wednesday, August 28 – 16:30 - 18:30

Room BA101	Room BA102	Room BA110	Room BA112
SS-SSMMBP-2 Simulations in Soft Matter and Molecular Bio-Physics - 2 **Session Chairs:** Nilhoufar Faghihi McGill University	**SS-HPTC-6** Recent progress in hyperbolic problems: Theory and Computation - 6 **Session Chairs:** Jae-Hun Jung SUNY University at Buffalo	**SS-MFMCR-2** Mathematical Finance Modelling, Computation and Risk Management - 2 **Session Chairs:** Campolieti, J., Metzler, A. Wilfrid Laurier University	**SS-EGT** Evolutionary Game Theory **Session Chairs:** Joe Apaloo,Ross Cressman St.Francis Xavier, Wilfrid Laurier University
16:30-16:50 #275 **Flow of spherical micellar solutions in confined channels** Habibi, Mona Western University	16:30-16:50 #99 **Challenging simulations of Black Hole Binaries** Lousto, Carlos Rochester Institute of Technology	16:30-16:50 #51 **Delayed Heston Model: Improvement of Vol Surface and Hedging of Vol Swaps** Swishchuk, Anatoliy University of Calgary	16:30-16:50#148 **Game-theoretic methods for functional response and optimal foraging behavior** Cressman, Ross Wilfrid Laurier University
16:50-17:30 #330 **Martini coarse-grained and atomistic simulations of lipids** Tieleman, Peter (Semi-plenary, p 23) University of Calgary	16:50-17:10 #434 **Fast recovery of far-field time-domain signals from near-field data** Field, Scott University of Maryland	16:50-17:10 #531 **A Bias-Reduction Technique for Monte Carlo Pricing of Multiple-Exercise Options** Reesor, Mark Western University	16:50-17:10 #185 **Interspecific strategic effects of mobility in predator-prey systems** Xu,Fei Wilfrid Laurier University
17:30-18:00 #314 **The role of PEGylation in drug delivery: what can molecular dynamics simulation tell us** Bunker, Alex University of Helsinki	17:10-17:30 #501 **Sparse spectral methods for helically symmetric gravitational binaries** Lau, Stephen University of New Mexico	17:10-17:30 #405 **A convolution method for numerical solution of backward stochastic differential equations** Hyndman, Cody Concordia University	17:10-17:30 # 242 **Infinite Niche Packing** Apaloo, Joe St. Francis Xavier University
18:00-18:30 #504 **Frontiers in Membrane Biophysics** Rheinstadter, Maikel McMaster University	17:30-17:50#415 **Gravitational and electromagnetic phenomena in strongly gravitating systems** Palenzuela, Carlos Perimeter Institute for Theoretical Physics	17:30-17:50 #584 **Efficient Monte Carlo Simulation For Integral Functionals of Brownian Motion** Kolkiewicz, Adam University of Waterloo	17:30-17:50 #336 **Plants and games:adaptive strategies for nutrient foraging and competition** McNickle, Gordon Wilfrid Laurier University
	17:50- 18:10# 128 **The Dynamics of a Scalar Field in Anti-de Sitter** Liebling, Steven Long Island University	17:50- 18:10# 562 **Hitting Times of Integrated Diffusions** McLeish, Don University of Waterloo	17:50-18:10 #534 **Dynamics of pattern networks in rock-paper-scissors type models** Menezes,Josinaldo Federal University of Rio Grande do Norte, Brazil
		18:10-18:30 #110 **Multiple barriers and assets in Financial Mathematics** Escobar, Marcos Ryerson University	18:10-18:30 #634 **Habitat Selection for the Ideal Free Distribution in Linear and Nonlinear(Allee Effect)Fitness** Tran,Tan Speaker

Wednesday, August 28 – 16:30 - 18:30

Room BA202	Room BA208	Room BA209	RoomBA211
SS-ME-1 Mathematical Epidemiology - 1 **Session Chairs:** Connell McCluskey Wilfrid Laurier University	**SS-NCTAP-4** New Computational Techniques for Applied Problems in Science and Engineering - 4 **Session Chairs:** Ludwig Kohaupt, Yan Wu Beuth University of Technology Berlin, Georgia Southern University	**SS-RTDEDS-2** Recent trends in differential equations and dynamical systems - 2 **Session Chairs:** Xinzhi Liu, Mohamad Alwan, Hongtao Zhang University of Waterloo	**CS-BSM-3** Mathematics and Computation in Biological Sciences and Medicine - 3 **Session Chairs:** H.S. Jhajj Punjabi University, Patiala
16:30-16:50	16:30-16:50 #627 **A Numerical Method for Multiple Time Scale Problems** Kadioglu, Samet Yildiz Technical University	16:30-16:50 #305 **Classification of Solutions of Second Order Nonlinear Neutral Delay Dynamic Equations** Panigrahi, Saroj University of Hyderabad	16:30-16:50 #641 **Dynamic models for rodent pest control: A case study of plateau pika** Zhang, F. Yuncheng University
16:50-17:50 #613 **The spatio-temporal spread of drug-resistant tuberculosis** Arino, Julien (Semi-plenary, p 16) University of Manitoba	16:50-17:10 #62 **A Bee Foraging Heuristic to Find a Route for Manet-Wcp** Liang, Yawei Royal Millitary College of Canada	16:50-17:10 #393 **Input-to-State Stability of Large-Scale Stochastic Impulsive Systems with Time Delay and Application** Alwan, Mohamad University of Waterloo	16:50-17:10 #546 **Modeling Oxygen Dynamics of the Retina-Using Discrete Exterior Calculus** Rusjan, Edmond SUNYIT, NY
17:50-18:10 #626 **The Spread of Infectious Disease with Imported Infections** Sigdel, Ram Wilfrid Laurier University	17:10-17:30 #97 **Interactive computational search strategy of periodic solutions in an essentially nonlinear dynamics** Lev Petrov Plekhanov Russian University of Economics	17:10-17:30 #403 **Impulsive Control and Synchronization of Spatiotemporal Chaos in Gray-Scott Model** Zhang, Kexue University of Waterloo	17:10-17:30 #560 **Role of predators in dynamics of niche construction** Berezovskaya, Fina Howard University
18:10-18:30#392 **A multi-strain analysis of Neisseria meningitidis on the impact of immunization in Canada** Poore, Keith University of Guelph		17:30-17:50 #483 **Chaos Entanglement: Leading Unstable Linear Systems to Chaos** Zhang, Hongtao University of Waterloo	17:30-17:50 #637 **Modelling 1, 5 and 10 μm Particle Deposition In Human Lung By CFD** Goncalves, Jose Federal University of Sao Carlos
		17:50-18:10 #508 **Recent results on stability of open-loop and closed-loop switched systems** Stechlinski, Peter University of Waterloo	17:50-18:10 #282 **Discrete Solitons for the Discrete Nonlinear Schrödinger Equations** Zhou, Z. Guangzhou University
		18:10-18:30 #569 **Discrete Dynamics of Differential Delay Equations** Ivanov, Anatoli Pennsylvania State University	18:10-18:30 #306 **Generalized Bessel Functions and Sturm Liouville Equations** Balsim, Igor Kingsborough Community College of CUNY

9.7 Poster Session – Thursday, August 29 – 10:00 - 10:30 & 15:00 - 15:30

Room BA110

CS-POST-1
Chair: M. Santoprete

10:00 - 10:30 & 15:00 - 15:30 # 18
Kazemlou Sheikhi, Ahmad
Ministry of Education of Talesh City, Iran
Comparing the Results of Transforming Differential Method and Adomian Method in Solving Third Order Nonlinear Delay Differential Equation

10:00 - 10:30 & 15:00 - 15:30 # 408
De Sanctis, Bianca
University of Calgary
A Phenomenological Model for the Mechanism of Influenza-A Virus Budding and Scission

10:00 - 10:30 & 15:00 - 15:30 # 146
Xin, Xin
University of Guelph
Random Jitter Methods for Type 2 Ties in Survival Analysis

10:00 - 10:30 & 15:00 - 15:30 # 340
Bovard, Luke
University of Waterloo
Short-wave vortex instability in stratified flow

10:00 - 10:30 am & 3:00 – 15:30 pm # 506
Duncan, Grant
Laurentian University.
A Mathematical Model For Treatment Selection

10:00 - 10:30 & 15:00 - 15:30 # 583
Prabhakar, Sanjay
Wilfrid Laurier University
Parallel numerical methods for time dependent Schrodinger equations in the analysis of quantum heterostructures

10:00 - 10:30 & 15:00 - 15:30 # 522
Kloosterman, Matt
University of Waterloo
A Closed NPZ Model with Delayed Nutrient Recycling

10:00 - 10:30 & 15:00 - 15:30 # 594
Wang, J. Y
Laurentian University
Application of Advanced Diagonalization Methods to Quantum Spin Systems

Room BA111

CS-POST-2
Chair: M. Santoprete

10:00 - 10:30 & 15:00 - 15:30 # 61
Leal da Silva, Priscila
Universidade Federal do ABC, Brazil
On the group analysis of a modified Novikov equation

10:00 - 10:30 & 15:00 - 15:30 # 138
Newlands, Nathaniel
Agriculture and Agri-Food Canada
Downscaling of regional climate scenarios within agricultural areas across Canada with a multi-variate, multi-site statistical model

10:00 - 10:30 & 15:00 - 15:30 # 163
Johnson, Sam
National Institute of Technology Karnataka, India
Multiplication Operators with Closed Range in Operator Algebras

10:00 - 10:30 & 15:00 - 15:30 # 471
Rocha, Paulo
Universidade de Brasilia
Invariant Solutions of the 2+1 dimensional Gross-Neveu Equations

10:00 - 10:30 am & 3:00 – 15:30 pm # 575
Jiwari, Ram
Thapar University, India
A Differential Quadrature Algorithm for Numerical Treatment of Two-Dimensional Hyperbolic Equation

10:00 - 10:30 & 15:00 - 15:30 # 619
Billel, Negal
University Badji Mokhtar Annaba, Algeria
Convergence of the Regularized Sinc Collocation Method Applied to First kind Fredholm Integral Equation

10:00 - 10:30 & 15:00 - 15:30 # 375
Khor, Susan
Independent Post-Doc
Domain interactions from Protein interactions with Formal Concept Analysis

10:00 - 10:30 & 15:00 - 15:30 # 329
Liu, Bin
University of Waterloo
Simulation Studies of cationic/PC lipids monolayers at air/water interface

9.8 Thursday, August 29 – 10:30 - 12:30

Room BA101	Room BA102	Room BA110	Room BA111	Room BA112
SS-SSMMBP-3 Simulations in soft matter and molecular Bio-Physics - 3	**SS-SNDTA-1** Symmetry in Nonlinear Dynamics: Theory and Applications - 1	**SS-MFMCR-3** Mathematical Finance - Modeling, Computation and Risk Management - 3	**SS-SGT** Structured Graph Theory	**SS-CMS-1** Computational Materials Science - 1
Session Chairs: Frances Mackay Western University	**Session Chairs:** Manuele Santoprete, Ray McLenaghan Wilfrid Laurier University, University of Waterloo	**Session Chairs:** Joe Campolieti, Adam Metzler Wilfrid Laurier University	**Session Chairs:** Chinh Hoang, Kathie Cameron Wilfrid Laurier University	**Session Chairs:** Haipeng Wang, Ziad Saghir NPU and University of Toronto, Ryerson University
10:30-10:50 #419 **Multiple Replica Repulsion Technique for Efficient Conformational Sampling of Biological Systems** Malevanets, Anatoly The Hospital for Sick Children, Toronto	10:30-10:50 #66 **Relative Equilibria and Rotopulsators of the Curved N-Body Problem** Diacu, Florin University of Victoria	10:30-10:50 #206 **Long-dated foreign exchange interest rate derivatives: modeling, computational challenges, and parallel computation via a PDE approach** Dang, Duy-Minh University of Waterloo	10:30-10:50 #258 **Total Coloring of Graphs Embedded in Surfaces of Nonnegative Euler Characteristic** Wang, Huijuan Shandong University	10:30-10:50 #139 **Homogeneous crystallization of Si136 clathrate from liquid: Molecular dynamics simulations** Lu, Yongjun Beijing Institute of Technology
10:50-11:10 #374 **Exploring the Polyelectrostatic Model of Sic1-Cdc4 Interaction using Coarse-Grained Explicit-Chain Simulations** Song, Jianhui University of Toronto	10:50-11:10 #202 **Orbits in the Symmetric Four-body Problem** Sweatman, Winston Massey University	10:50-11:10 #250 **An unconditionally monotone numerical scheme for the two factor uncertain volatility model** Ma,Kai University of Waterloo	10:50-11:10 #646 **On magic labeling of type (1, 1, 1) for the subdivision of prisms** Hussain, Muhammad COMSATS Institute of IT	10:50-11:10 #589 **Task Based Parallelization of Molecular-Dynamics Simulations with Short-Range Forces** Meyer, Ralf Laurentian University
11:10-11:30 #556 **Velocity and energy distributions in microcanonical ensembles of hard spheres** Germano, Guido Philipps-Universität Marburg	11:10-11:30 #444 **Saari's homographic conjecture for the planar equal-mass three-body problem under the Newton potential and a strong force potential** Fujiwara, Toshiaki Kitasato University	11:10-11:30 #236 **Computation of the Loss Distribution Based on the Structural Model for Credit Portfolios** Han, Meng RBC Capital Markets, Toronto	11:10-11:30 #245 **On Hendrys conjecture on cycle extension** Sritharan, R. The University of Dayton	11:10-11:30 #135 **Molecular Dynamics Simulation of Density for Undercooled Liquid Zirconium** Wang, Haipeng Northwestern Polytechnical University; University of Toronto
11:30-11:50 #507 **Ordered Mononucleotide Arrays in Multilamellar Lipid Matrices: Implications for the Origin of Life** Toppozini, Laura McMaster University	11:30-11:50 #221 **Symplectic Semiclassical Wave Packet Dynamics** Ohsawa, Tomoki University of Michigan-Dearborn	11:30-11:50 #652 **Hedging Costs for Variable Annuities under Regime Switching** Azimzadeh, Parsiad University of Waterloo	11:30-11:50 #339 **Constructions of k-critical P5-free graphs** Sawada, Joe University of Guelph	11:30-11:50 #253 **Investigation on Temperature Uniformity in Thermo-Diffusion Cells** Farahbakhsh, Bahram Ryerson University
11:50-12:10 #511 **Nano-scale Dimer Motor in a Chemical Gradient** Colberg, Peter University of Toronto	11:50-12:10 #158 **A new approach to the integrability of the Suslov problem** Fernandez, Oscar Wellesley College		11:50-12:10 #537 **Completing colored graphs to meet a target property** Eschen, Elaine West Virginia University	11:50-12:10 #401 **Nucleation Heterogeneity in Shape Memory Alloys: Studies with 3D Coupled Thermo-Mechanical Phase-Field Models** Dhote, Rakesh University of Toronto; Wilfrid Laurier University
12:10-12:30 #642 **Escape from adaptive conflicts in the evolution of protein folds: bi-stability, mutational robustness, and gene duplication** Sikosek, Tobias University of Toronto	12:10-12:30 #247 **An obstruction class for isotropic fibrations** Butler, Leo Central Michigan University		12:10- 12:30 #601 **Coloring graphs without induced paths of fixed lengths** Hoang, Chinh Wilfrid Laurier University	12:10-12:30 #98 **Drilling Force and Temperature of Metalic Material with Hollow Drill** Wang, Wendong Northwestern Polytechnical University; Univerisity of Toronto

Thursday, August 29 – 10:30 - 12:30

Room BA202	Room BA208	Room BA209	Room BA210
SS-ME-2 Mathematical Epidemiology - 2 **Session Chairs:** Zhisheng Shuai University of Central Florida	**SS-WSM-1** Women in Science and Mathematics - 1 **Session Chairs:** Shohini Ghose, Hind Al-Abadleh Wilfrid Laurier University	**SS-HOMCFD-1** High-Order Methods in Computational Fluid Dynamics - 1 **Session Chairs:** Lilia Krivodonova, Hans De Sterck University of Waterloo	**SS-ANMPDE-1** Advanced Numerical Methods for PDEs and Applications - 1 **Session Chairs:** Peter A. Forsyth, Dong Liang University of Waterloo, York University
10:30-10:50 #142 **Mass Media Effects on an Influenza Epidemic** Collinson, Shannon York University	10:30-10:50 #210 **The Power of Diversity: Womens Leadership in STEM** Giordan, Judith Chemical Angels Network	10:30-10:50 #285 **Parallel High-Order CENO Finite-Volume Method for Large-Eddy Simulation of Turbulent Premixed Flames** Tobaldini Neto, Luiz University of Toronto Institute for Aerospace Studies	10:30-10:50 #30 **Optimal Trade Execution: Mean Variance or Mean Quadratic Variation?** Forsyth, Peter Univerity of Waterloo
10:50-11:10 #168 **Sustained and transient oscillations induced by delayed antiviral immune response in an immunosuppressive infection model** Wang, Lin University of New Brunswick	10:50-11:10 #395 **Fast, recursive and numerically stable algorithms for discrete sine transformations having orthogonal factors** M. Perera, Sirani Daytona State College	10:50-11:10 #337 **High-Order Central ENO Finite-Volume Scheme for Ideal MHD** Susanto, Andree University of Waterloo	10:50-11:10 #198 **B-Spline Collocation Software for PDEs with Efficient Interpolation-Based Spatial Error Estimation** Muir, Paul Saint Mary's University
11:10-11:30 #325 **The impact of the Anopheles mosquito lifestyle, feeding and reproductive habits in the transmission dynamics of Malaria-implications for control** Teboh-Ewungkem, Miranda Lafayette College	11:10-11:30 #521 **Chemical Property Prediction based on Spectral Signature of Properties on Molecular Surfaces** Heidar Zadeh, Farnaz McMaster University	11:10-11:30 #430 **Assessment and Comparison of Discretization Techniques for the Diffusion Operator in High-Order Finite-Volume Methods** Ivan, Lucian University of Waterloo	11:10-11:30 #212 **(Towards) a multicore adaptive space time method for PDEs** Haynes, Ronald Memorial University of Newfoundland
11:30-11:50 #573 **A Century of Transitions in New York City's Measles Dynamics** Hempel, Karsten McMaster University	11:30-11:50 #548 **Fibre bundle framework for quantum fault tolerance** Zhang, Lucy Liuxuan University of Toronto, Perimeter Institute	11:30-11:50 #373 **An Adaptive High Order Discontinuous Galerkin Solver for Direct Numerical Simulation** Mavriplis, Catherine University of Ottawa	11:30-11:50 #95 **New Progress on Energy-Conserved S-FDTD Methods for Maxwell's Equations** Liang, Dong York University
11:50-12:10 #540 **Population-level effects of suppressing fever** Earn, David McMaster University	11:50-12:10 #614 **Topos Formulation of Quantum Theory** Flori, Cecilia Perimeter Institute for Theoretical Physics	11:50-12:10 #428 **Examining nonlinear wave propagation in the trumpet** Resch, Janelle University of Waterloo	11:50-12:10 #64 **ML-α-Deconvolution model in a bounded domain with a vertical regularization** Ali, Hani Paris-Descartes University
12:10-12:30 #200 **The Effects of Mass Gatherings on the Spatial Spread of an Epidemic** Xu, Fei Wilfrid Laurier University	12:10-12:30 #625 **Surface-enhanced quantum control: A SEQC way of controlling light and matter** Rangan, Chitra University of Windsor	12:10-12:30 #225 **Accelerated High-Order Solver for the Cahn-Hilliard Equation on General Domains** Abukhdeir, Nasser Mohieddin University of Waterloo	12:10-12:30 #550 **Application of Generalized Multiscale Finite Element Method in Multiphase Flow Models** Ginting, Victor University of Wyoming

Thursday, August 29 – 10:30 - 12:30

Room BA211	Room BA305
SS-ADS-1	**CS-AMPRE-1**
Canada-China Session on Applied Dynamic Systems - 1	
Session Chairs:	**Session Chairs:**
Yuming Chen, Fengqin Zhang, Xingfu Zou	Ellina Grigorieva
Wilfrid Laurier University, Yuncheng University, Western University	Texas Woman's University
10:30-10:50 #455	10:30-10:50 # 164
A positivity preserving semi-implicit numerical method for a highly nonlinear diffusion-taxis-reaction model	**Troeschs problem: Numerical simulation based on Haar wavelet collocation method**
Eberl, H.	Pundit, Sapna
University of Guelph	Motilal Nehru National Institute of Technology
10:50-11:10 #307	10:50-11:10 #40
Dirichlet problem of delayed reaction-diffusion equations involving semi-infinite intervals	**Mathematical Modeling of Glassy-winged Sharpshooter Population Dynamics**
Yi, Taishan	Yoon, Jeong-Mi
Central South University	University of Houston-Downtown
11:10-11:30 #149	11:10-11:30 #74
Advances in Impulsive Differential Equations	**Analytical methods in differential equations and optimal control:An Educational Approach**
Dai, Binxiang	Grigorieva, Ellina
Central South University	Texas Woman's University
11:30-11:50 #112	11:30-11:50 #125
Controllability of second order impulsive functional differential systems with infinite delay in Banach spaces	**Comparison between Adomian Method and Last Square Method For Solving HIV/AIDS non-linear system**
Li, Meili	Rahmani, Fouad Lazhar
Donghua University	Universite Constantine
11:50-12:10 #599	11:50-12:10 #144
The Impact of a Single-strain Flu Vaccine on the Dynamics of a Two-strain influenza	**Infinite families of (non)-Hermitian Hamiltonians associated with exceptional X_m Jacobi polynomials**
Rahman, Ashrafur	Roy, Barnana
University of Western Ontario	Indian Statistical Institute
12:10- 12:30 # 75	
Codimension-1 sliding bifurcations of Filippov pest growth model with threshold policy	
Tang, Sanyi	
Shaanxi Normal University	

9.9 Thursday, August 29 – 15:30 - 18:00

Room BA101

SS-SSMMBP-4
Simulations in soft matter and molecular Bio-Physics - 4

Session Chairs:
Chitra Narayanan

New Jersey Institute of Technology

15:30-15:50 #377
Investigating Peptide/RNA Binding Using Enhanced-Sampling Simulation Techniques
Do, Trang
University of Waterloo

15:50-16:30 #464
Role of dipolar interactions in protein folding

Matysiak, Silvina (Semi-plenary, p 21)
University of Maryland

16:30-17:00 #519
Unraveling the role of solvent-macromolecule interactions in determining the conformations of macromolecules in bulk, droplet and vacuum environments
Consta, Styliani (Stella)
University of Waterloo

17:00-17:30 #318
Various approaches for accelerating sampling of protein conformation : from amyloids to loop motion

Coté, Sébastien
Université de Montréal

17:30-18:00 #533
Computational Studies of Peptide and Proteins in Lipid Membranes

Pomès, Régis
Hospital for Sick Children, Toronto

Room BA102

SS-SNDTA-2
Symmetry in Nonlinear Dynamics: Theory and Applications - 2

Session Chairs:
Manuele Santoprete, Ray McLenaghan

Wilfrid Laurier University, University of Waterloo

15:30-15:50 #219
A Feasible Short-Step Primal-Dual Interior Point Algorithm for Solving Convex Quadratic Problems
Smirnov, Roman
Dalhousie University

15:50-16:10 #251
Orthogonal separation of the Hamilton-Jacobi equation on Spaces of Constant curvature

Rajaratnam, Krishan
University of Waterloo

16:10-16:30 #39
Reductions and solutions of ZK equation, Gardner KP and Extension KP equations using conservation laws

Naeem, Imran
Lahore University of Management Sciences

16:30-16:50 #381
Integrable Viscous Conservation Laws Submission

Arsie, Alessandro
University of Toledo

16:50-17:10 #326
Traveling Waves and Conservation Laws for Complex mKdV-type Equations

Wolf, Thomas
Northwestern Polytechnical University

Room BA110

CS-MECHE-1
Computational Mechanics and Engineering - 1

Session Chairs:
Ali Almansoori

The Petroleum Institute

15:30-15:50 #604
A newly designed hot extrusion die modeling and its comparison with conventional dies

Yeprem, Aygul H.
Yildiz Technical University

15:50-16:10 #38
Computational Analysis of Slender Body with Varying Elliptical Cross Section at Various AOAs
Shams, Taimur
National University of Sciences & Technology, NUST

16:10-16:30 #133
Stochastic modeling of the Oil Sands operations under environmental constraints

Betancourt-Torcat, Alberto
The Petroleum Institute

16:30-16:50 #298
Supply Chain Flexibility Metrics Evaluation

Erol Genevois, Mujde
Galatasaray University

16:50-17:10 #208
Effect of Particle Gradient on the Creep of an Isotropic Rotating Disc

Rattan, Minto
Brock University

17:10-17:30 # 390
Design, Facbrication and Testing of a Hybrid Magnetostrictive-Poezoelectric Energy Harvesting Unit
Ibrahim, Mohammed
University of Waterloo

Room BA111

SS-LSNE-3
Lie symmetry and other approaches in theory and applications of nonlinear equations - 3

Session Chairs:
C.M. Khalique, M. Abudiab

North-West University RSA, Texas A&M University

15:30-15:50 #54
Lie group classification for a generalized coupled Lane-Emden system of dimension one
Khalique, Chaudry Masood
North-West University

15:50-16:10 #461
A Computational Study of Forced Oscillations of a Korteweg-de Vries Type Equation
Usman, Muhammad
University of Dayton

16:10-16:30 #56
Conservation laws of a system of coupled KdV equations

Muatjetjeja, Ben
North-West University

16:30-16:50#58
In this work the (G'/G)-expansion method is used to determine exact solutions of coupled Kortweg de Vries and coupled Boussinesq equations
Mothibi, Dimpho Millicent
Panjab University

16:50-17:10 #59
In this talk we look for exact solutions of the Klein-Gordon-Zakharov equations, which describes the interaction between Langmuir waves and ion sound waves
Mhlanga, Isaiah Elvis
Noth West University

Room BA112

SS-CMS-2
Computational Materials Science - 2

Session Chairs:
Haipeng Wang, Ziad Saghir

NPU and University of Toronto, Ryerson University

15:30-15:50 #166
Twinning in Strained Ferroelastics: Microstructure and Statistics

Ding, Xiangdong
Xi'an Jiaotong University

15:50-16:10 #259
Phase separation and dendritic growth of bulk undercooled ternary Co-Cu-Pb alloy

Yan, Na
Northwestern Polytechnical University

16:10-16:30 #335
Analysis of twinned crystals via eigensymmetries of crystallographic orbits

Marzouki, Mohamed Amine
Radboud University Nijmegen

16:30-16:50 #244
Hysterisis Algorithm For Alleviating Organic LED Degradation

Yang, Ning
Northwestern Polytechnical University

16:50-17:10 #213
Dendritic Growth Velocity Calculation and Microstructural Evolution of Ni-Cu-Si Alloy

Wang, Haipeng
Northwestern Polytechnical University

17:10-17:30 #92
Non-equilibrium solidification in undercooled faceted-faceted Ni-56.2 Si at % eutectic alloy

Lu, Yiping
Dalian University of Technology

Thursday, August 29 – 15:30 - 18:00

Room BA202	Room BA208	Room BA209	Room BA210
SS-ME-3 Mathematical Epidemiology - 2 **Session Chairs:** Lin Wang University of New Brunswick	**SS-WSM-2** Women in Science and Mathematics - 1 **Session Chairs:** Shohini Ghose, Hind Al-Abadleh Wilfrid Laurier University	**SS-HOMCFD-2** High-Order Methods in Computational Fluid Dynamics - 1 **Session Chairs:** Lilia Krivodonova, Hans De Sterck University of Waterloo	**SS-ANMPDE-2** Advanced Numerical Methods for PDEs and Applications - 1 **Session Chairs:** Peter A. Forsyth, Dong Liang University of Waterloo, York University
15:30-15:50 #140 **Pair approximation models of foot and mouth disease. Impacts of IP/CP culling, ring and prophylactic vaccination, vaccine waning, loss of disease-induced immunity and disease re-introduction** Ringa, Notice University of Guelph	15:30-15:50 #629 **ZeroHopf bifurcation in the hyperchaotic Lorenz system** Cid-Montiel, Lorena Wilfrid Laurier University	15:30-15:50 #366 **High-Order Summation-by-Parts Discretization of the Navier-Stokes and Euler Equations** Del Rey Fernández, David C. University of Toronto Institute for Aerospace Studies	15:30-15:50 #368 **Domain Decomposition Techniques for Electromagnetic Scattering from Thin Wires** Haslam, Michael York University
15:50-16:10 #484 **Target Reproduction Number and Its Applications to Infectious Disease Control** Shuai, Zhishengi University of Central Florida	15:50-16:50 #645 **Fifteen Years of Funded Programs to Advance Women in Science and Engineering: Progress and Persistent Challenges** Mavriplis, Catherine 24 University of Ottawa	15:50-16:10 #309 **High-Order Finite Volume Element Methods for Elliptic PDEs with Singularities, and Applications to Capillarity** De Sterck, Hans University of Waterloo	15:50-16:10 #207 **An numerical impulse control PDE approach for continuous time optimal portfolio allocation under jump-diffusions** Dang, Duy-Minh University of Waterloo
16:10-16:30 #487 **Modelling pre-emptive vaccination to prepare for bioterrorist attacks** Molina, Chai McMaster University	16:50-17:10 #648 **Computational Thinking and Simulations in Teaching Science and Mathematics** Shodiev, Hasan Wilfrid Laurier University	16:10-16:30 #463 **Analysis of Heterogeneous Multiscale Methods for Long Time Multiscale Wave Propagation Problems** Runborg, Olof KTH Royal Institute of Technology	16:10-16:30 #130 **Efficient Splitting Characteristic Method for Aerosol Transports in Environment** Fu, Kai York University
16:30-16:50 #27 **Optimal Infectious Disease Control** Grigorieva, Ellina Texas Woman's University	17:10 - 18:00 **Women in Science - Panel Discussion** A. Hind, S. Ghose Wilfrid Laurier University	16:30-16:50 #180 **Simulation of the Mixing in An Imploding Shell** Wang, Lili The Institute of Applied Physics and Computational Mathematics, p. R. China	16:30-16:50 #271 **A Truncated FCI Approach Motivated from the Mathematics of Complexity for Solving the Electronic and Nuclear Schrödinger Equation** Anderson, James Peking University
16:50-17:10 #87 **Seasonal dynamics in an SIR epidemic system** Sari, Nadir University of La Rochelle		16:50-17:10 #82 **Study on Turbulent Mixing Induced by Richtmyer-Meshkov Instability Using the Second-Order Moment Model** Yang, Min	16:50-17:10 #203 **On the game p-Laplacian on graphs for processing and clustering of high dimensionnal data** Elmoataz, Abderahim University of Caen Basse Normandy
17:10-17:30 #91 **A mathematical model for the spread of ectoparasite-borne diseases** Dénes, Attila University of Szeged			17:10-17:30 #641 **Multicomponent polymer flooding in two dimensional oil reservoir simulation** Kenettinkara, Sudarshan Kumar TIFR Centre for Applicable Mathematics

Thursday, August 29 – 15:30 - 17:30

Room BA211	Room BA305
SS-ADS-2	**CS-AMPRE-2**
Canada-China Session on Applied Dynamic Systems - 1	Applied Problems and Methods in Research & Education - 2
Session Chairs:	**Session Chairs:**
Yuming Chen, Fengqin Zhang, Xingfu Zou	Ellina Grigorieva
Wilfrid Laurier University, Yuncheng University, Western University	Texas Woman's University
15:30-16:50 #177	15:30-16:50 #459
Agent-Based Modelling for Disease Dynamics in-silico Populations	**Optimal designs for heteroscedastic accelerated life testing models with multiple factors**
Moghadas, Seyed M.	Krzeminski, Mark
York University	Brock University
15:50-16:10 #85	15:50-16:10 #189
Modeling effects of environmental contamination and volunteers on hospital infections in China	**Electrical contact resistance of micro-switch systems**
Xiao, Yanni	Haj Mohammad Jafar, Reza
Xi'an Jiaotong University	University of Toronto
16:10-16:30 #261	16:10-16:30 #279
Global stability of some epidemic models with age structure	**New Exceptional Orthogonal Polynomials and Non-linear algebras associated to the Quantum system**
Yang, Junyuan	Dutta, Debjit
Yuncheng University	Indian Statistical Institute
16:30-16:50 #78	16:30-16:50 #442
Using Lyapunov Functions to Construct Lyapunov Functionals	**A New Approach of Particle Swarm Optimization based on Inverse Survival Function**
McCluskey, Connell	Singh, Sharandeep
Wilfrid Laurier University	Punjabi University
16:50-17:10 #181	
Epidemic dynamics on semi-directed complex networks	
Jin, Zhen	
North University of China	
17:10-17:30 #288	
Mathematical Model of Anaerobic Digestion in a Chemostat: Effects of Syntrophy and Inhibition	
Wolkowicz, Gail	
McMaster University	

9.10 Friday, August 30 – 10:30 - 12:50

Room BA101

SS-SSMMBP-5
Simulations in soft matter and molecular Bio-Physics - 5
Session Chairs:
Cristiano L. Dias
New Jersey Institute of Technology

10:30-10:50 #518
Stability and Cooperativity of Protein Folding in Crowded and Confined Environments
Linhananta, Apichart
Lakehead University

10:50-11:10 #478
Interactions of extended peptide conformations and beta-sheet formation
Dias, Cristiano
New Jersey Institute of Technology

11:10-11:30 #513
Calculating Free Energy of the Aggregation of the Peptide (HHC-36) In Bulk
Vafaei, Shaghayegh
University of Guelph

11:30-11:50 #495
The implication of stochastic resonance effects on neurological disease quantifications
Das, Tushar
University of Waterloo

11:50-12:10 #356
A Numerical Study on Tissue Topology Using Single Cell Based Model
Mkrtchyan, Anna
Western University

Room BA102

SS-CFDRA-1
Computational Fluid Dynamics for Real Applications - 1
Session Chairs:
Lakhdar Remaki, Stéphane Moreau, Abdelkader Baggag
BCAM, Sherbrooke, Laval

10:30-10:50 #4
Modeling of Bubble Motion in a Sound Field
Khattar, Dinesh
Kirori Mal College, Delhi University

10:50-11:10 #7
On axisymmetrical boundary problem of unsteady motion of micropolar fluid in the half-space
El-Sirafy, Ibrahim
Alexandria University

11:10-11:30 #12
The construction of an Integral formula for computing Cylindrical and Non-cylindrical Flow in the Region Bounded by Two Coaxial Cylinders of Varying Radii
Pavlika, Vasos
University of London

11:30-11:50 #224
Design considerations for thermal management of electronics enclosures
Cocks, Rachele
Regal Beloit Corporatoin

11:50-12:10 #238
Magnetic field effect on the natural convection flow in a cavity
Bozkaya, Canan
Middle East Technical University

12:10-12:30 #497
A CFD Optimization of Airflow Efficiency for an Electric Motor Driven Centrifugal Fan System for Residential HVAC Applications
Cocks, Rachele
Regal Beloit Corporatoin

Room BA110

CS-MECHE-2
Computational Mechanics and Engineering - 2
Session Chairs:
Salehian, Armaghan
University of Waterloo

10:30-10:50 #211
Effect of Anisotropy on the Steady State Creep in a Rotating Cylinder
Chamoli, Neeraj
D.A.V. College, Chandigarh, India

10:50-11:10 # 446
Strip-saturation-induction model mode-III solution for piezo-electro-magnetic strip
Verma, Pooja Raj
Indian Institute of Technology Roorkee

11:10-11:30 #445
Strip-saturation-yield model for a piezoelectric plate: A study on influence of change in poling direction
Jangid, Kamlesh
Indian Institue of Technology, Roorkee

11:30-11:50 #653
Design and Testing of a Hybrid Energy Harvesting Device Using a Spiral Piezoelectric Unit and a Central Magnet
Salehian, Armaghan
University of Waterloo

11:50-12:10 #134
Mixed-integer optimization of material and energy integrations in an eco-industrial park network
Kantor, Ivan
University of Waterloo

Room BA111

SS-MIPD-1
Mathematical Immunology and Pathogen Dynamics - 1
Session Chairs:
Jonathan Forde
Hobart and William Smith Colleges

10:30-10:50 #555
Linking immunology and epidemiology: dynamics of human rhinovirus in an immune-structured host population
Laverty, Sean
University of Central Oklahoma

10:50-11:10 #67
Dynamics of In-host Malaria Model
Gumel, Abba
University of Manitoba

11:10-11:30 #111
Hiv Escape from Ctl Response during Acute Infection: Modeling and Inference
Leviyang, Sivan
Georgetown University

11:30-11:50 #65
Understanding antibody-host dynamics following EIAV infection
Ciupe, Stanca
Virginia Tech

11:50-12:10 # 312
Modeling HIV-1 virus dynamics
Zou, Xingfu
Western University

12:10-12:30 # 118
Using within-host mathematical modelling to predict the long-term outcome of human papillomavirus vaccines
Smith?, Robert
University of Ottawa

Room BA112

SS-IM
Industrial Mathematics
Session Chairs:
Sean Bohun
UOIT

10:30-10:50 #386
Quality assessment of medical images using the structural similarity index
Kowalik-Urbaniak, Ilona
University of Waterloo

10:50-11:10 #204
Some recent mathematics-in-industry study group projects from Australia and New Zealand
Sweatman, Winston
Massey University

11:10-11:30 #509
Modelling and Simulation of Atmospheric Pollutant Dispersion
Stockie, John
Simon Fraser University

11:30-11:50 #525
Optimal Flu Vaccination in a Multiple Group Model
Kloosterman, Matt
University of Waterloo

11:50-12:10 #289
Dominatedly Non-Decreasing Approximations for Waiting Time Asymptotics of the M/G/2 Queue with Heterogeneous Servers
Sani, Sulaiman
University of Botswana

12:10- 12:30 #592
Modelling Mass Transfer in a Rotating Disk Reaction Vessel
Bohun, C Sean
UOIT

12:30-12-50 # 448
3D Modeling of some industrial processes of steel heat treating
Garcia Vazquez, Conception
University of Cadiz

Friday, August 30 – 10:30 - 12:50

Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
CS-CPC-1 Computational Physics and Chemistry - 1 **Session Chairs:** Marek Wartak Wilfrid Laurier University	**SS-MMNN** Mathematical Models for Nanoscience and Nanotechnology **Session Chairs:** Lyon, K, Anicic, R. University of Waterloo	**SS-QCTA-1** Quantum Control: Theory and Application -1 **Session Chairs:** Lian-Ao Wu IKERBASQUE, Basque Foundation of Science and University of the Basque Country	**SS-DBCNDE-1** Dynamics and bifurcations in coupled networks of differential equations: theory and applications - 1 **Session Chairs:** Luciano Buono UOIT	**SS-NMDAEA** Numerical methods for differential-algebraic equations and applications **Session Chairs:** Griewank, A., Nedialkov, N., Pryce, J. Humbolt University, Cardiff University
10:30-10:50 #22 **Avoiding the coordinate singularity problem in the numerical solution of the Dirac equation in cylindrical coordinates** Fillion-Gourdeau, Francois Centre de recherches mathematiques	10:30-10:50 #93 **An integral equation solver for the simulation of two-dimensional metallic nanoplasmonics** Kurkcu, H. Gulf University of Science and Technology, Kuwait	10:30-10:50 #20 **Fast and Robust Spin Manipulation in a Quantum Dot by Electric Fields** Sherman, Eugene University of Basque Country	10:30-10:50#553 **Network synchronization and mixed couplings: when friends turn enemies and vice versa** Belykh, Igor Georgia State University	10:30-10:50#90 **Optimization of large scale DAE systems in chemical process design and control using parallel computing** Washington, Ian McMaster University
10:50-11:10 #50 **A discrete stochastic model for pitting corrosion** Van der Weeen, Pieter Ghent University, Belgium	10:50-11:10 #363 **Tackling Surface Roughness in Graphene Plasmonics** Lyon, K. University of Waterloo	10:50-11:10 #24 **Tight-binding models for ultracold atoms in honeycomb optical lattices** Modugno, Michele University of Waterloo	10:50-11:10#628 **Chaos and reliability in fluctuation-driven, balanced spiking networks** Lajoie, Guillaume University of Washington	10:50-11:10# 296 Progress on the DAESA tool for structural analysis of DAEs Pryce, John Cardiff University
11:10-11:30 #122 **GKS Scheme for Compressible Two-phase Flow Models Containing Non-conservative Products** Zhao, Guiping National Natural Science of China	11:10-11:30 #416 **Piezo-electromechanical effects in embedded nanowire superlattices** Prabhakar, S. Wilfrid Laurier University	11:10-11:30 #37 **Cooling and probing a nanomechanical resonator coupled to a double quantum dot** You, Jianqiang Beijing Computational Research Cente	11:10-11:30# 178 **Low-dimensional descriptions of neural networks** Barreiro, Andrea Southern Methodist University	11:10-11:30# 605 **Symbolic application of the Pryce Σ-method for index reduction of DAEs in CyModelica** Harman, Peter CyDesign Ltd.
11:30-11:50 #635 **Nonequilibrium Green's function approach to simulations of active photonic nanostructures** Wartak, Marek Wilfrid Laurier University	11:30-11:50 #427 **Effects of finite ion size and dielectric saturation of water in electrolytically top-gated graphene** Sharma, P. University of Waterloo	11:30-11:50 #260 **Experimental novel and robust quantum control of single electron spin in diamond** Du, Jiangfeng University of Science and Technology of China	11:30-11:50 #227 **Emergent Collective Behaviour on Stochastic Coupled Cell Networks** DeVille, Lee University of Illinois	11:30-11:50 #441 Structural analysis and dummy derivatives - some relations McKenzie, Ross Cardiff University
11:50-12:10 #603 **We obtain complete set of constraints on the moduli of N=4 superstring compactifications that permit rare marginal decays of 1/4 -BPS dyons to take place** Nigam, Rahul BITS-Pilani, India	11:50-12:10 #576 **Spectra of Few-body complexes in Quantum Dot Molecules** Khoshnegar, M. University of Waterloo	11:50-12:10 #48 **Stochastic Schrödinger Equation for Open Fermionic Systems** Yu, Ting Stevens Institute of Technology	11:50-12:10#160 **Instabilities in delayed regulatory loops of the haematopoietic system** Bélair, Jacques Université de Montréal	11:50-12:10 # 491 **A simple method for Quasilinearity Analysis of DAEs** Nedialkov, Ned McMaster University
12:10-12:30 #650 **Adaptive Matrix Transpose Algorithms for Distributed Multicore Processors** Bowman, John University of Alberta	12:10-12:30 #389 **Substrate structure effects on electrical properties of graphene** R. Anicic University of Waterloo			
12:30-12:50 #558 **Partial dynamic structure factors of molten sodium chloride investigated by molecular dynamics simulation** Germano, Guido Philipps-Universität Marburg	12:30-12:50#579 **Effect of Microwave and Terahertz Radiation on Superconducting Nanowires** Jafari Salim, Amir University of Waterloo			

9.11 Friday, August 30 – 15:30 - 18:00

Room BA101	Room BA102	Room BA111	Room BA112
SS-SSMMBP-6 Simulations in soft matter and molecular Bio-Physics - 6 **Session Chairs:** Joel Berry McMaster University	**SS-CFDRA-2** Computational Fluid Dynamics for Real Applications - 2 **Session Chairs:** Lakhdar Remaki, Stéphane Moreau, Abdelkader Baggag BCAM, Sherbrooke, Laval	**SS-MIPD-2** Mathematical Immunology and Pathogen Dynamics - 2 **Session Chairs:** Stanca Ciupe Virginia Tech	**SS-SAEEM** Statistical Aspects of Environmental and Ecological Modeling **Session Chairs:** Vyacheslav Lyubchich University of Waterloo
15:30-15:50 #485 **Understanding beta-sheet stabilization - Lessons from a model hairpin peptide** Narayanan, Chitra New Jersey Institute of Technology	15:30-15:50 #535 **Wake Topology for Steady Flow past an Inclined Elliptic Cylinder** Young, Peter NATO Communications and Information Agency	15:30-15:50 #187 **A study of recurrent infection in deterministic in-host models** Zhang, W. Western University	15:30-15:50 #450 **Estimation of Absolute and Relative Abundance** Horrocks, Julie University of Guelph
15:50-16:20 #197 **Principles of Protein Folding from Coarse-Grained Modeling** Chan, Hue Sun University of Toronto	15:50-16:10 #612 **A robust computational procedure for nonlinear thermo-electrical problems in fractured media based on XFEM** Baggag, Abdelkader	15:50-16:10 #161 **Modeling within-host dynamics of influenza virus infection** Rong, L. Oakland University	15:50-16:10 #354 **Censored Gamma Regression with Applications** McLeod, Ian Western University
16:20-16:50 #223 **Intrachain ordering and segregation of polymers in a confined space** Ha, Bae-Yeun University of Waterloo	16:10-16:30 #622 **CFD Simulation of Biomass Gasification using Circulating Fluidized Bed by Eulerian-Eulerian Approach** Liu, Hui University of Waterloo	16:10-16:30 # 226 **The importance of cell-to-cell transmission during the acute stage of HIV infection** Wells, Chad Yale University	16:10-16:30 # 286 **Analyzing Inter-Annual Variability in North America Net Ecosystem CO2 Exchange** Luus, Kristina University of Waterloo
16:50-17:20 #527 **Dynamics of water molecules: Rockin' and jumping** Karttunen, Mikko University of Waterloo	16:30-16:50 #644 **Influence Of Thermal Radiation on Natural Convection In Porous Enclosure Due To Lateral Heat flux** Pippal, Sarita	16:30-16:50 #440 **Immunology and the Dynamics of Hepatitis Delta Virus Infection** Forde, Jonathan Hobart and William Smith Colleges	16:30-16:50 #412 **Accounting for Temperature when Modeling Population Health Risk Due to Air Pollution** Burr, Wesley Queen's University
17:20-17:50 #512 **Nonequilibrium Methods for Calculating the Potential of Mean Force for Biomolecular Systems** Gray, Chris University of Guelph	16:50-17:10 #213 **Dendritic Growth Velocity Calculation and Microstructural Evolution of Ni-Cu-Si Alloy** X. Ma Northwestern Polytechnical University	16:50-17:10#436 **The known unknowns and the unknown unknowns** Beauchemin, C. Ryerson University	16:50-17:10 #554 **Testing for synchronism among trends in environmental data** Lyubchich, Vyacheslav University of Waterloo
	17:10-17:30 #92 **Non-equilibrium solidification in undercooled faceted-faceted Ni-56.2 Si at % eutectic alloy** Lu, Yiping Dalian University of Technology		17:10-17:30 #657 **Changing stream flow augmented challenges: Modeling of water allocation policy for eco-hydrological sustainability in Maine, USA** Khan, Md. Rakibul University of Maine
18:00-18:15 Presentation of AMMCS Student and Young Researcher Awards. Chair: Manuele Santoprete			

Friday, August 30 – 15:30 - 17:50

Room BA202

CS-CPC-2

Computational physics and chemistry - 2

Session Chairs:
Lin Wang
University of New Brunswick

15:30 - 15:50 #388
Properties of Dimethylimidazolium Chloride- Molecule of the Mono-substituted Benzene at T=400K by Molecular Dynamics Simulation
Atamas, Nataliia
Kiev Taras Shevchenko University

15:50-16:10 #431
Polarizability Calculations of Linearly Conjugated Systems Using Matrix Product States
Kim, Taewon
McMaster University

16:10-16:30 #454
Using Computational Chemical Methods to Gain Insights into the Enzymatic Mechanism of LuxS
Gherib, Rami
University of Windsor

16:30-16:50 #494
Investigation of Calcium Chloride Aqueous Solutions/Hexane Interfaces: A Molecular Dynamics Study
Pour Khiabani, Nahid
University of Tehran

16:50-17:10 #606
The dynamics of the fluxion in curved Josephson junction
Dobrowolski, Tomasz
Institute of Physics UP, Cracow, Poland

17:10-17:30 #636
Thermodynamic and dynamic anomalies in a simple one-dimensional lattice model of water
Barbosa, Fernando
UnB

Room BA208

SS-RPSETS

Recent progress in spintronics: Experiment, theory and simulation

Session Chairs:
Jingrun Chen and Xu Yang
UC Santa Barbara

15:30 - 15:50 #263
Switching current and thermal stability of perpendicular-anisotropy CoFeB-MgO based magnetic tunnel junctions
Sato, Hideo
Center for Spintronics Integrated Systems, Tohoku University

15:50-16:10 #532
Spin-polarized currents in ferromagnetic multilayers
Garcia-Cervera, Carlos
UC Santa Barbara

16:10-16:30 #241
An Introduction to Spin Effects in Organic Solar Cells
Chen, Jingrun
University of California, Santa Barbara

16:30-16:50#549
Magnetic Ordering and Thermally Enhanced Magnetism in Quantum Dots
Pientka, James
University at Buffalo

16:50-17:10#420
Domain Wall Trajectory Determined by its Fractional Topological Edge Defects
Pushp, Aakash
IBM Almaden Research Center

17:10-17:30#252
Effective dynamics of electrons in crystals
Yang Xu
University of California, Santa Barbara

Room BA209

SS-QCTA-2

Quantum Control: Theory and Application - 2

Session Chairs:
Lian-Ao Wu
IKERBASQUE, Basque Foundation of Science and University of the Basque Country

15:30 - 15:50 #116
Correlation Dynamics and Scaling Behavior of Two-Qubit System in the Spin-Chain Environments
Lin, Hai-Qing
Beijing Computational Science Research Center

15:50-16:10 #328
Scaling of Spin Qubit Decoherence in Semiconductors
Hu, Xuedong
University at Buffalo, SUNY

16:10-16:30 #647
Remarks on the (non)controllability of Schroedinger equations
Teismann, Holger
Acadia University

Room BA210

SS-DBCNDE-2

Dynamics and bifurcations in coupled networks of differential equations: theory and applications - 2

Session Chairs:
Pietro Luciano Buono
UOIT

15:30 - 15:50 #264
Collective Behavior of a Network of Spin Torque Nano-Oscillators
Palacios, Antonio
San Diego State University

15:50-16:10 # 361
A Network of Symmetrically Coupled Gyroscopes
Chan, Bernard
San Diego State University

16:10 - 16:30 #544
Reduced dynamics and noise stabilization for stochastic delayed systems
LeBlanc, Victor
University of Ottawa

16:30-16:50 #630
Bifurcations of Networks of Heterogeneous Integrate and Fire Neurons
Nicola, Wilten
University of Waterloo

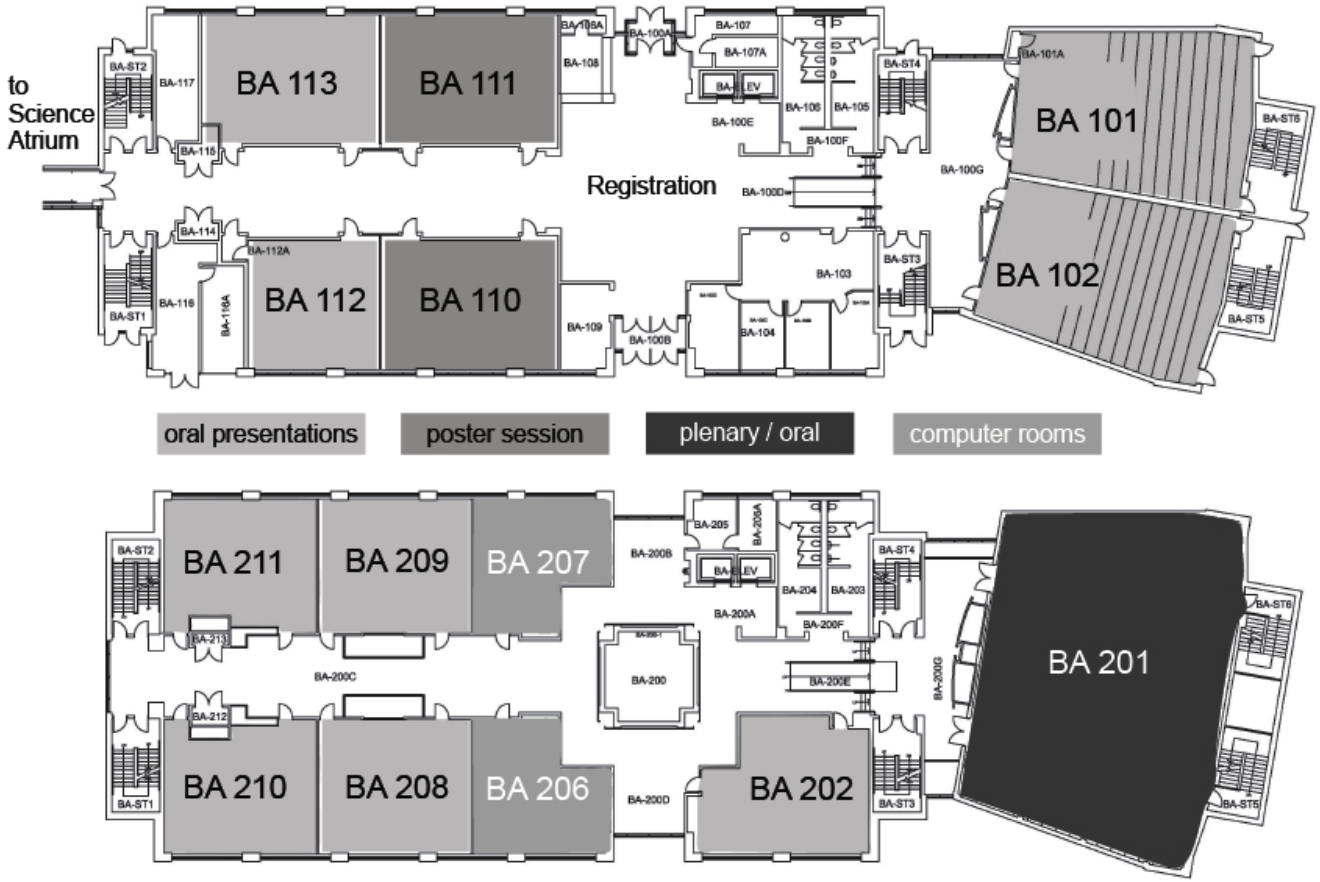
649
Introducing chaos in a gene regulatory network by coupling an oscillating-dynamics with a hyteresis-type one
Poignard, Camille
Laboratory of Mathematics, J. A. Dieudonné

Friday, August 30 – 15:30 - 17:30

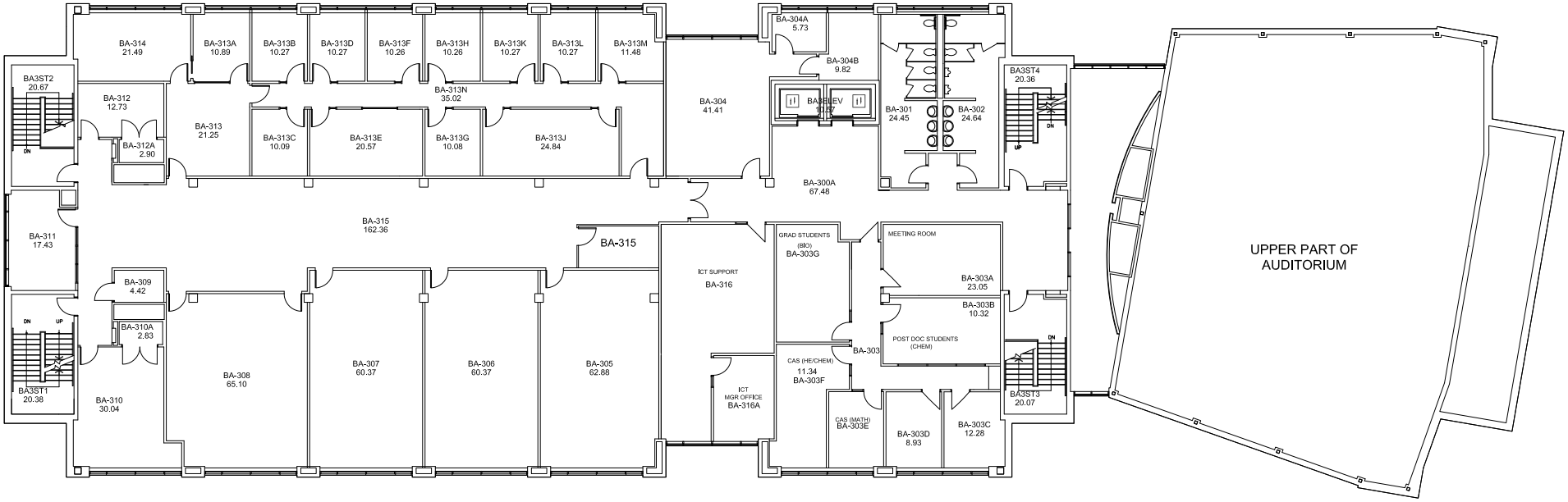
Room BA211	Room BA305
SS-CMAIS	**SS-VPPO**
Control Methods for Advanced Industrial Systems	Variational Problems of Physical origin
Session Chairs:	**Session Chairs**
Behzad Samadi and Jürgen Gerhard	Robert Jerrard, Andrew Lorent
Maplesoft	University of Toronto, University of Cincinnati
15:30-15:50 #346	15:30-15:50 #344
Symbolic Methods in Control Theory	**Global stability and instability of solutions to nonlinear parabolic and hyperoblic equations**
Gerhard, Jürgen	Kalantarov, Varga
Maplesoft	Koc University, Istanbul, Turkey
15:50-16:10 #486	15:50-16:10 # 654
Discovering Lyapunov functions for dynamical systems using simulation	**Front speed enhancement by large incompressible flows in 3 dimensions**
Kapinski, James	El Smaily, Mohamad
Toyota	University of Toronto
16:10-16:30 #347	16:10-16:30#387
Using Kernel Module Bases for fast polynomial matrix arithmetic	**Variational problems with nonlocal operators**
Labahn, George	Melgaard, Michael
University of Waterloo	University of Sussex
16:30-16:50 #469	16:30-16:50#476
Transverse feedback linearization and exterior differential systems	**Thin limit theories in nonlinear elasticity and infinitesimal isometries**
Nielsen, Christopher	Pakzad, Reza
University of Waterloo	University of Pittsburgh
16:50-17:10 #479	16:50-17:10#587
Model Predictive Control via Triangular Decompositions of Semi-Algebraic Systems	**A generalized Stoilow decomposition and applications**
Chen, Changbo	Lorent, Andrew
	University of Cincinnati
17:10-17:30 #398	437
An optimal predictive control strategy for a plug-in hybrid electric powertrain	Stable Vortex States in Superconductivity
Taghavipour, Amir	Contreras, Andres
University of Waterloo	McMaster University

10 Maps

10.1 Bricker Academic Building - Floors 1 and 2 Map

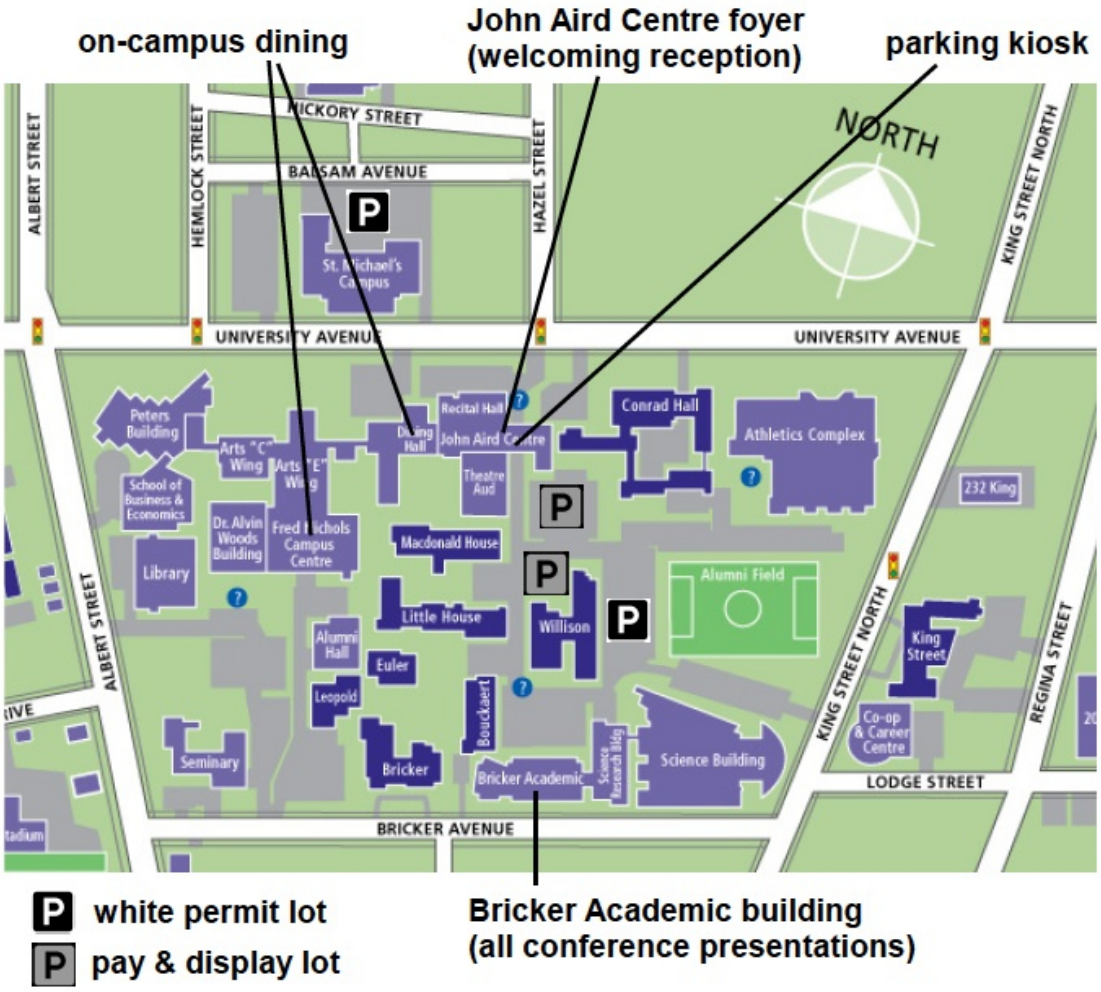


10.2 Bricker Academic Building - Floor 3 Map



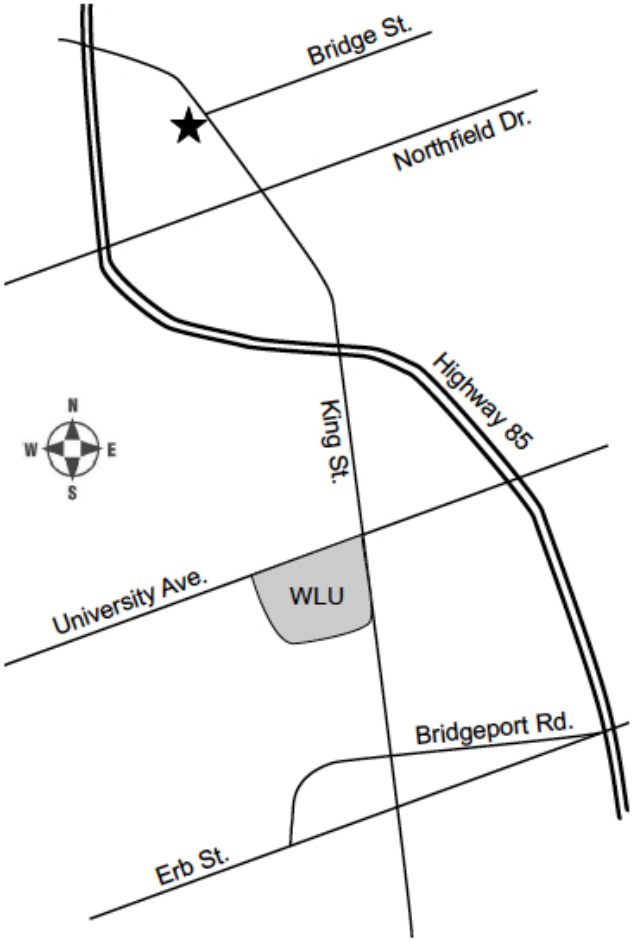
BLDG. CODE - 43
FLOOR CODE - 43L03
EXTERIOR GROSS AREA =
19522.30 sq. ft.
1813.62 sq. m.

10.3 Wilfrid Laurier University Campus



10.4 Directions to the Conference Banquet

St. George Hall, 665 King St. N, Waterloo (at Bridge St.)
10 minute drive from Wilfrid Laurier University campus



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