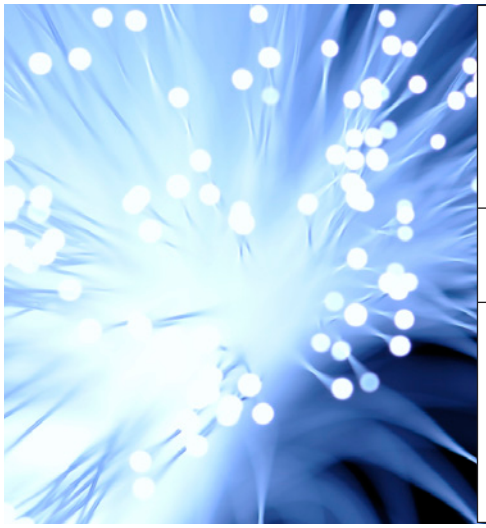
The INTERNATIONAL CONFERENCE on
APPLIED MATHEMATICS,
MODELING and COMPUTATIONAL SCIENCE



AMMCS2011

A Laurier Centennial Conference

JULY 25–29

WILFRID LAURIER UNIVERSITY | WATERLOO, ONTARIO, CANADA

Mathematics and Computation in Biological Sciences and Medicine
Partial Differential and Integral Equations in Mathematical Modeling
Applications of Dynamical Systems and Differential Equations
Computational Physics and Chemistry
Computational Algebra, Combinatorics and Optimization
Mathematical Models in Social Sciences
Computational Mechanics and Engineering
Financial Mathematics and Computation
Statistical Modeling in Envrionmental Sciences
Computational Methods for Hyperbolic Problems
Applied Problems and Methods in Research and Education

CONFERENCE PROGRAM

Program Chair
Brian R. West

Contents

Registration

The AMMCS-2011 registration desk is located in the 1st floor of the Bricker Academic building. It will be staffed at the following times:

Sunday, July 24	15:00 - 18:00 (@ Bricker) and 19:00 - 21:00 (@ John Aird Centre Foyer)
Monday, July 25	7:30 - 11:30 and 13:30 - 16:00
Tuesday, July 26	8:30 - 10:30 and 13:30 - 15:30
Wednesday, July 27	8:30 - 10:30
Thursday, July 28	8:30 - 10:30 and 13:30 - 15:30
Friday, July 29	8:30 - 10:30

Acknowledgments

Organizing Committee

General Co-chairs	Ilias Kotsireas
	Roderick Melnik
Program Chair	Brian West
Treasurer	Zilin Wang
Student Prize Committee Chair	Cristina Stoica
Local Organizing Committee	Francine Vinette
SIAM Representative	Roderick Melnik

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Matthew Johnston
Breanne King
Minodora Lache
Maaheesha Ramanan
Bogdan Alexandru Rusu
Grant Simms
Richard Simms

Conference Events

Welcoming Reception

Sunday, July 24 – 19:00 - 21:00 *John Aird Centre Foyer*
Join your fellow AMMCS-2011 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 page 57 for directions.*

Conference Banquet

Thursday, July 28 – 19:30 - 22:00 *St. George Hall, 665 King St. N, Waterloo* – `www.stgeorgehall.com`
After-dinner speech by **Phelim Boyle**, *School of Business and Economics, Wilfrid Laurier University*
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, July 26.
For those requiring transportation, a bus will be provided.
- *see page 58 for directions.*

Student Prize Competition and Young Researcher Awards

Friday, July 29 – 19:00 - 19:15 *BA101*
At the conclusion of the conference, the winners of the AMMCS-2011 Student Prize Competition will be announced.

Three separate competitions will be held for undergraduate and graduate students:

1. **Best AMMCS-2011 Poster**. To be eligible, the student must be a co-author of the work presented and a designer of the poster. This competition will include a 10 minute discussion with a judging panel, related to the content of the poster. The poster presentations are scheduled for Tuesday, July 28.
2. **Best AMMCS-2011 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-2011 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-2011 awards for young researchers that include postdoctoral fellows will also be announced.

Maplesoft Product Demonstrations

Wednesday, July 27 – 14:00 - 16:00 *BA206 & BA207*
- *see page 22 for more information*

Information for Visitors

Wireless Networking

AMMCS-2011 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-2011 attendees. In particular, you may use these rooms to check your email or edit your presentations (on PowerPoint). The rooms will be open from 8:30 to 19:00 each day of the conference, except for Wednesday, July 27 between 14:00 and 16:00. For login information, please go to the registration desk.

Parking

AMMCS-2011 attendees who are living on campus will be issued a parking permit (included in the residence cost) upon check-in at the residence. Attendees who are living off campus may puchase 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-2011 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**. See page 57 for a map that shows locations of white permit lots.

Parking is free on weekends and after 16:30 on weekdays.

Public Transit

The WLU campus can be reached by city bus (routes 7C, 7D, 7E, 8, 9, and 12, and the iXpress route). Route maps are available at the registration desk or at `www.grt.ca`.
For a taxi, call 519-888-7777.

AMMCS-2011 thanks the following sponsors for their generous support

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Welcome to AMMCS-2011

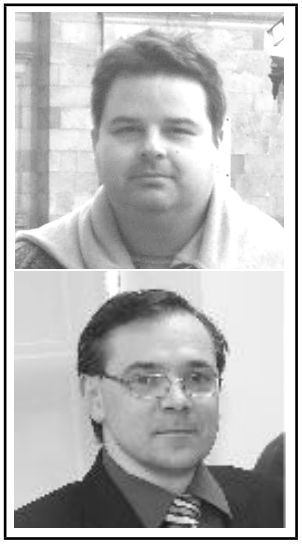
On behalf of Wilfrid Laurier University I extend a very warm welcome to all delegates to the 2011 International Conference on Applied Mathematics, Modeling and Computational Science. Your week-long event will enable you to explore the university and our community as well as the intellectual pursuits in which you excel.

Our university is named after the seventh Prime Minister of Canada who served as leader of our country from 1896 to 1911 (the year of founding of the university). He is widely regarded by historians as one of the best Prime Ministers that Canada has elected. During his term of office he reconciled differences among our founding French and English speaking populations, he established a clear Canadian identity and increased our national autonomy within the Commonwealth, he established closer relations with the United States, and he oversaw the addition of two western provinces to our federation. His legacy lives on today in the work "Inspiring Lives of Leadership and Purpose" that the university does so proudly and effectively. It also lives on in the prosperous, highly tolerant, welcoming and inclusive society that Canada is today.

I hope that you will take the opportunity to explore the campus and to enjoy our community. And I extend my very best wishes for a highly successful and engaging conference.

With best wishes to all,

Max Blouw
President and Vice-Chancellor
Wilfrid Laurier University



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 July 24 through 29, 2011 on the Waterloo Campus of the Wilfrid Laurier University, Canada.

The conference has an exciting scientific program featuring nearly 50 special and contributed sessions in several parallel tracks, as well as 10 one-hour talks given by distinguished scientists and mathematicians. 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.

The AMMCS-2011 is held in the year of the 100^{th} anniversary 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.

Ilias Kotsireas and Roderick Melnik,
Conference Co-Chairs

Plenary Speakers

Monday, July 25 – 9:00 - 10:00 **Room BA201**

Stephen Watt

Computer Science Department
The University of Western Ontario (Canada)

Mathematical Modeling in Mathematical Handwriting Recognition

Stephen Watt is Distinguished University Professor of the University of Western Ontario, located in London, Canada. He received his PhD from the University of Waterloo in 1986 for early work on parallel computer algebra. Watt held a series of positions at IBM Research at Yorktown Heights, then the University of Nice and INRIA, before arriving at the University of Western Ontario in 1997. Watt is internationally recognized as an expert in the field of computer algebra. He was one of the early investigators in parallel computer algebra systems and a pioneer in the areas of symbolic-numeric algorithms and mathematical knowledge management. He is one of the original authors of the Maple and Axiom computer algebra systems, creator of the Aldor programming language for symbolic computation and a principal in the creation of the MathML and InkML internet standards. His current areas of focus are algorithms for polynomials with symbolic exponents and mathematical handwriting recognition.

Abstract

Accurate computer recognition of handwritten mathematics offers to provide a natural interface for mathematical computing, document creation and collaboration. Mathematical handwriting, however, provides a number of challenges beyond what is required for the recognition of handwritten natural languages. On one hand, it is usual to use symbols from a range of different alphabets and there are many similar-looking symbols. Mathematical notation is two-dimensional and size and placement information is important. Additionally, there is no fixed vocabulary of mathematical "words" that can be used to disambiguate symbol sequences. On the other hand there are some simplifications. For example, symbols do tend to be well segmented. With these characteristics, new methods of character recognition are important for accurate handwritten mathematics input.

We present a geometric theory that we have found useful for recognizing mathematical symbols. Characters are represented as parametric curves approximated by certain truncated orthogonal series. This maps symbols to a low dimensional vector space of series coefficients in which the Euclidean distance is closely related to the variational integral between two curves. This can be used to find similar symbols very efficiently. We describe some properties of mathematical handwriting data sets when mapped into this space and compare classification methods and their confidence measures. We also show how, by choosing the functional basis appropriately, the series coefficients can be computed in real-time, as the symbol is being written and, by using integral invariant functions, orientation-independent recognition is achieved. The beauty of this theory is that a single, coherent view provides several related geometric techniques that give a high recognition rate and that do not rely on peculiarities of the symbol set.

Monday, July 25 – 14:00 - 15:00 **Room BA201**

Igor Shparlinski
Department of Computing
Macquarie University (Australia)

Group Structures of Elliptic Curves: Statistics, Heuristics, Algorithms

Igor Shparlinski is a Professor of Macquarie University, in 2010 he was awarded the title of Distinguished Professor. In 1996, he was awarded a Medal of the Australian Mathematical Society for his activities in the area of applications of number theory to computer science. He is a fellow of the Australian Academy of Science (since 2006) and of the Australian Mathematical Society (since 2000). He is a recipient of Australian Professorial Fellowship (2005-2010) and the Medal of the Australian Mathematical Society.

His research areas are number theory and its applications to computer science, cryptography and discrete mathematics. He serves on editorial boards of several journals specialising in these areas.

Abstract

We study the collection of group structures that can be realized as a group of rational points on an elliptic curve over a finite field (such groups are well known to be of rank at most two). We also study various subsets of this collection.

Some of these results are rigorous and based on recent advances in analytic number theory, some are conditional under certain widely believed conjectures, and others are purely heuristic in nature and exhibit several interesting and unexplained phenomena in the distribution of group structures.

Finally, we discuss some algorithms to compute group structures of elliptic curves over finite fields.

Plenary Speakers

Tuesday, July 26 – 9:00 - 10:00 **Room BA201**

David Cai

Courant Institute
New York University (USA)

Mathematical Analysis of Neuronal Network Dynamics

David Cai is currently a professor of mathematics and neural science at Courant Institute of Mathematical Sciences and the Center for Neural Science, New York University. He received his B.S. from Peking University, China, and Ph.D. from Northwestern University, U.S. His research interests include applied mathematics, theoretical physics, and theoretical and computational neuroscience.

Abstract

From the perspective of nonlinear dynamical systems, nonequilibrium statistical physics, and scientific modeling, we will review our computational modeling of the dynamics of the primary visual cortex and describe recent developments of mathematical methods used in analysis of the dynamics of neuronal networks arising from the brain.

We will present a kinetic theory approach to study neuronal network dynamics and discuss the interplay between the dynamics over the network and the topology of the network, such as random networks and scale-free networks. Finally we will briefly address the issue of anatomical connectivity and functional connectivity in the brain.

Tuesday, July 26 – 10:30 - 11:30 **Room BA201**

Mark Carpenter

NASA Langley Research Center (USA)

Towards a Robust, Multi-Domain, Energy Stable WENO Formulation for High Speed Flows

Mark H. Carpenter received a BS in Chemistry from Bethel College in 1981, and a PhD in Mechanical Engineering (combustion emphasis) from Carnegie-Mellon in 1986. After graduation he accepted a position at NASA Langley Research Center, Hampton VA, USA. He has worked at Langley continuously for nearly 25 years, with the exception of a sabbatical year (2006) serving as a visiting professor at "Technical University of Delft", Delft, The Netherlands. His research interests include the development of 1) high-order finite difference and spectral methods, 2) high-order explicit and implicit temporal integrators and 3) linear and nonlinear solvers. The applications motivating this development over the past decade include DNS/LES of high-speed, chemically reacting flows, boundary layer stability and transition phenomena, and acoustic liner development. He currently serves on the editorial board of *Journal of Scientific Computing*, and the advisory panel for the International Conference of Spectral and High-order methods.

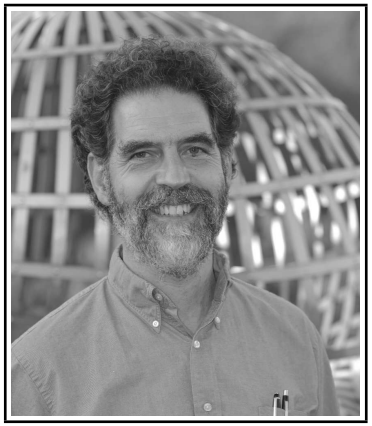
Abstract

Weighted Essentially NonOscillatory (WENO) schemes are routinely used to perform high resolution simulations of canonical problems containing discontinuities, and are extremely successful in this context. Because conventional WENO formulations have numerous structural and design constraints (e.g. structured meshes, accuracy, conservation, stencil biasing...), extension to complex geometries is problematic. Herein, we demonstrate a general multi-block WENO capability, based on uniformly accurate fourth-order and sixth-order, finite-domain, Energy Stable WENO (ESWENO) operators. The individual blocks feature boundary closures that maintain design accuracy, conservation and L^2 stability, while accommodating full WENO stencil biasing. The adjoining blocks are coupled using interface penalties motivated by Internal Penalty and DG formulations. Test cases are presented that demonstrate the efficacy of the new multi-domain ESWENO approach on high speed flow problems.

This work is performed in conjunction with Dr. Nail K. Yamaleev (*North Carolina A&T State University, USA*), and Travis Fisher (*NASA Langley Research Center, USA*).

Plenary Speakers

Tuesday, July 26 – 14:00 - 15:00 **Room BA201**



Walter Craig

Department of Mathematics and Statistics
McMaster University (Canada)

Lower Bounds on the Navier-Stokes Singular Set

Dr. Craig received his doctorate in mathematics in 1981 from the Courant Institute. Following this he has held academic positions in the California Institute of Technology, Stanford University and Brown University, where he was chair of the Mathematics Department. He moved to McMaster University in 2000 as Canada Research Chair of Mathematical Analysis and its Applications. His research interests are in nonlinear partial differential equation, Hamiltonian dynamical systems, and their applications to problems motivated by the physical sciences. He has been a Sloan Foundation Fellow, and he is currently a Killam Research Fellow. He was elected to the Royal Society of Canada in 2007.

Abstract

The well-known result of partial regularity for solutions of the Navier-Stokes equations provides an upper bound on the size of the singular set of (suitable) weak solutions. This talk will describe complementary lower bounds, both for the the singular set and the energy (L^2) concentration set, in case that they are nonempty. These bounds are microlocal in nature, and are based on a novel estimate for weak solutions of the Navier-Stokes equations.

Part of these results represents joint work with A. Biryuk and M. Arnold.

Wednesday, July 27 – 9:00 - 10:00 **Room BA201**

Suzanne Lenhart
Mathematics Department
University of Tennessee, Knoxville (USA)

Mixing it up: Discrete and Continuous Optimal Control for Biological Models

Suzanne Lenhart is a full professor in the Mathematics Department at the University of Tennessee. She was a part-time research staff member at Oak Ridge National Laboratory from 1987-2009. Her research involves partial differential equations, ordinary differential equations and optimal control of biological and physical models. She has a 2007 book, "Optimal Control applied to Biological Models."

She was the President of the Association for Women in Mathematics in 2001-2002. She was elected to the Board of Trustees of the Society for Industrial and Applied Mathematics in 2004 and again in 2007. She is the Associate Director for Education, Outreach and Diversity for the National Institute for Mathematical and Biological Synthesis. Lenhart was the director of the Research Experiences for Undergraduates summer program for UT Math. Dept. from 1990-2005 and now directs such a program for the institute.

Abstract

This presentation will illustrate optimal control methods applied to several types of models, including a mixture of discrete and continuous features. The applications range from a discrete model for cardiopulmonary resuscitation to partial differential equation models for rabies in raccoons. Detailed results will be given for harvesting in a PDE fishery model that answers the question: Does a marine reserve occur when maximizing harvest yield?

Plenary Speakers

Thursday, July 28 – 9:00 - 10:00 **Room BA201**

Alan Edelman

Department of Mathematics
Massachusetts Institute of Technology (USA)

Random Matrix Theory in Applied Mathematics, Modeling, and Computational Science

Professor Edelman has been working in the area of random matrix theory, numerical algorithms and high performance computing for 25 years. He has won many prizes for his work including the prestigious Householder Award, Gordan Bell Prize, and various Best Paper Prizes. In 2011 he was elected a SIAM Fellow. He is the founder of Interactive Supercomputing acquired by Microsoft. He holds and has applied for several patents in the area of high performance computing networks, algorithms, and software. He is widely recognized for his broad expertise in pure mathematics, algorithms, and applications. Edelman has consulted for IBM, Thinking Machines, Pixar, Akamai, Microsoft, Los Alamos National Labs, and others. Random Matrix Theory is a deep passion ... He believes that whole branches of science and engineering are waiting to be transformed by this subject.

Abstract

Random matrix theory continues to be a powerful tool for so many applications, yet the number of scientists familiar with the various aspects of the theory remains relatively small at this time. Further the theory is developing rapidly with very many open problems.

This talk will give a general overview of the theory and delve into a few applications and open problems.

Thursday, July 28 – 13:45 - 14:45 **Room BA201**

Chi-Wang Shu
Division of Applied Mathematics
Brown University (USA)

Inverse Lax-Wendroff Procedure for Numerical Boundary Conditions of Hyperbolic Equations

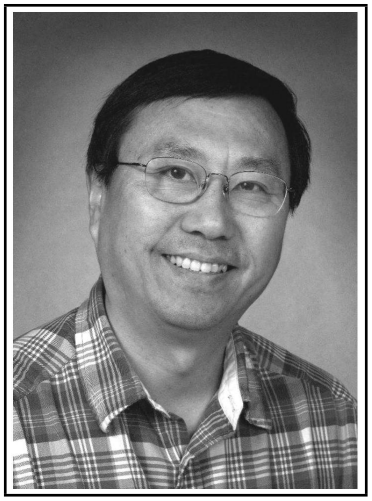
Chi-Wang Shu obtained his BS degree from the University of Science and Technology of China in 1982 and his PhD degree from the University of California at Los Angeles in 1986. He came to Brown University as an Assistant Professor in 1987, moving up to Associate Professor in 1992 and Full Professor in 1996. He was the Chair of the Division of Applied Mathematics between 1999 and 2005, and is now the Theodore B. Stowell University Professor of Applied Mathematics. His research interest includes high order finite difference, finite element and spectral methods for solving hyperbolic and other convection dominated partial differential equations, with applications to areas such as computational fluid dynamics, semi-conductor device simulations and computational cosmology. He is the managing editor of *Mathematics of Computation* and the chief editor of *Journal of Scientific Computing*. His honors include the First Feng Kang Prize of Scientific Computing in 1995 and the SIAM/ACM Prize in Computational Science and Engineering in 2007. He is an ISI Highly Cited Author in Mathematics and a SIAM Fellow.

Abstract

We develop a high order finite difference numerical boundary condition for solving hyperbolic Hamilton-Jacobi equations and conservation laws on a Cartesian mesh. The challenge results from the wide stencil of the interior high order scheme and the fact that the boundary may not be aligned with the mesh and can intersect the grids in an arbitrary fashion. Our method is based on an inverse Lax-Wendroff procedure for the inflow boundary conditions. We repeatedly use the partial differential equation to write the normal derivatives to the inflow boundary in terms of the tangential derivatives and the time derivatives (for time dependent equations). With these normal derivatives, we can then impose accurate values of ghost points near the boundary by a Taylor expansion. At the outflow boundaries, we use Lagrange extrapolation or least squares extrapolation if the solution is smooth, or a weighted essentially non-oscillatory (WENO) type extrapolation if a shock is close to the boundary. Extensive numerical examples are provided to illustrate that our method is high order accurate and has good performance when applied to one and two dimensional scalar or system cases with the physical boundary not aligned with the grids and with various boundary conditions including the solid wall boundary condition.

This is a joint work with Ling Huang and Mengping Zhang (for the Hamilton-Jacobi equations) and with Sirui Tan (for the time dependent conservation laws).

Plenary Speakers



Friday, July 29 – 9:00 - 10:00 **Room BA201**

Ming Li

David R. Cheriton School of Computer Science
University of Waterloo (Canada)

Kolmogorov Complexity and its Applications in Computer Science

Ming Li is a Canada Research Chair in Bioinformatics and a University Professor at the University of Waterloo. He is a fellow of the Royal Society of Canada, ACM, and IEEE. He is a recipient of E.W.R. Steacie Fellowship Award in 1996, the 2001 Killam Fellowship, and the 2010 Killam Prize. Together with Paul Vitanyi they have co-authored the book "An Introduction to Kolmogorov Complexity and its Applications". He is a co-managing editor of *Journal of Bioinformatics and Computational Biology*. He is an Associate Editor-in-Chief of *Journal of Computer Science and Technology*.

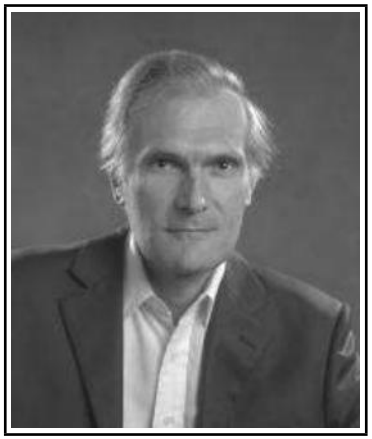
Abstract

Computer Science, as a science of information processing, has risen as a major disclipline during the past half century. Along with it, a new mathematical theory – Kolmogorov complexity – has emerged. In this talk, we will explain two applications of Kolmogorov complexity in computer science.

The first application is on the average-case analysis of algorithms. In computer science, analyzing the average behavior of an algorithm is a difficult task as, by definition, it involves averaging over all inputs. It would make the average-case analysis easy if we could find a "typical input" which causes the program run in the "average-case". Such a typical input can never be found but it exists according to Kolmogorov complexity. We will demonstrate how to use this fact to give an average case analysis of ShellSort, partially solving an open question of 40 years; and to give a very simple proof of Lovasz Local Lemma.

The second application is on how to measure information distance between any two information carrying entities. This optimal metric has been successfully applied to measure the distances between two genomes, two chain letters, two images, two programs, a query and an answer on the internet, and many other applications.

Friday, July 29 – 14:00 - 15:00 **Room BA201**



Alberto Bressan
Department of Mathematics
Penn State University (USA)

Dynamic Blocking Problems

Alberto Bressan completed his undergraduate studies at the University of Padova, Italy, and received a Ph.D. from the University of Colorado, Boulder, in 1982. He has held faculty positions at the University of Colorado, Boulder, and at the International School for Advanced Studies in Trieste, Italy. Presently he is Eberly Chair Professor of Mathematics at the Pennsylvania State University.

His scientific interests lie in the areas of differential inclusions, control theory, differential games, and hyperbolic systems of conservation laws.

A. Bressan delivered one of the plenary lectures at the International Congress of Mathematicians, Beijing 2002. He received various awards, including the A. Feltrinelli prize from the Accademia Nazionale dei Lincei in Rome, 2006, and the M. Bôcher prize from the American Mathematical Society, 2008. He currently serves on the editorial board of 17 mathematical journals.

Besides mathematics, he enjoys playing piano and flute. He lives in State College with his wife Wen Shen and two daughters, Luisa Mei and Maria Lan.

Abstract

The talk will describe a new class of optimization problems, motivated by the confinement of wild fires, or of the spreading of chemical contaminations.

In absence of control, the region burned by the fire is modeled as the reachable set for a differential inclusion. We assume that fire propagation can be controlled by constructing "barriers", in real time. These are represented by rectifiable sets in the plane, which cannot be crossed by trajectories of the differential inclusion. For this model, several results will be presented, concerning:

1. The speed at which the barrier must be constructed, in order to eventually contain the fire.
2. The existence of an optimal strategy, minimizing the total value of the burned region.
3. Relations with Hamilton-Jacobi equations with obstacles.
4. Necessary conditions for optimality, and the "instantaneous value of time".
5. Examples of explicit solutions.

Some related questions and open problems will also be discussed.

Special Symposia and Organizers

SS-AAIP	Applied Analysis and Inverse Problems	Marcus Garvie, *University of Guelph (Canada)* Herb Kunze, *University of Guelph (Canada)*
SS-AQT	Queueing Theory and Applications	Douglas Woolford, *Wilfrid Laurier University (Canada)* David Stanford, *University of Western Ontario (Canada)*
SS-BNANO	Computational Bionanotechnology	Hin-Hark Gan, *New York University (USA)* Gaurav Arya, *UC San Diego (USA)*
SS-CA	Differential and Integral Symbolic-Numeric Algorithms	Ekaterina Shemyakova, *University of Western Ontario (Canada)*
SS-CBSG	Connections Between Statistics and Genetics	John Braun, *University of Western Ontario (Canada)* Douglas Woolford, *Wilfrid Laurier University (Canada)*
SS-CC	Computational Chemistry	Ian Hamilton, *Wilfrid Laurier University (Canada)* Randall Dumont, *McMaster University (Canada)*
SS-CDPB	Complex Dynamics of Population Behaviour with Impact to Socio-Economic Issues	Monica Cojocaru, *University of Guelph (Canada)* Christopher Hogg, *University of Guelph (Canada)* Veronica Gheorghiade, *University of Guelph (Canada)*
SS-CMHP	Computational Methods for Hyperbolic Problems	Jae-Hun Jung, *SUNY at Buffalo (USA)* Allen Tesdall, *CUNY College of Staten Island (USA)*
SS-CNP	Computational Nanophotonics	Marek Wartak, *Wilfrid Laurier University (Canada)* Brian West, *Wilfrid Laurier University (Canada)*
SS-CNT	Computational Number Theory	Kevin Hare, *University of Waterloo (Canada)* Patrick Ingram, *University of Waterloo (Canada)*
SS-DAE	Design and Analysis of Experiments and Statistical Methods	Manohar L. Aggarwal, *University of Memphis (USA)*
SS-EG	Evolutionary Games in Biology and Ecology	Joe Apaloo, *St. Francis Xavier University (Canada)* Ross Cressman *Wilfrid Laurier University (Canada)*
SS-EHT	Recent Advances in Energy Harvesting Technologies	Armaghan Salehian, *University of Waterloo (Canada)*
SS-HAM	Homogenization and Applications in the Modeling of Nanoplasmonic Sensors	Chitra Rangan, *University of Windsor (Canada)*
SS-HDS	Recent Progress on Hybrid Dynamical Systems	Xinzhi Liu, *University of Waterloo (Canada)*
SS-HONM	High Order Numerical Methods for Partial Differential Equations	Ching-Shan Chou, *The Ohio State University (USA)* Jun Jia, *Oak Ridge National Laboratories (USA)* Yulong Xing, *Univ. of Tennessee and Oak Ridge National Laboratories (USA)*
SS-HPC	High Performance Computing: From Models of Computation to Applications	Marc Moreno Maza, *University of Western Ontario (Canada)* Yuzhen Xie, *University of Western Ontario (Canada)*
SS-IM	Industrial Mathematics	Sean Bohun, *UOIT (Canada)* Huaxiong Huang, *York University (Canada)*
SS-LSCA	Large Scale Computer Algebra Applications	Thomas Wolf, *Brock University (Canada)*
SS-MB	Recent Advances in Mathematical Biology	Sue Ann Campbell, *University of Waterloo (Canada)* Yuming Chen, *Wilfrid Laurier University (Canada)*

Special Symposia and Organizers *cont'*

SS-MBP	Modeling in Biophysics	Bae-Yeun Ha, *University of Waterloo (Canada)* Mikko Karttunen, *University of Western Ontario (Canada)*
SS-MCMI	Mathematical and Computational Modeling of Influenza	Catherine Beauchemin, *Ryerson University (Canada)* Hana Dobrovolny, *Ryerson University (Canada)*
SS-MMNS	Mathematical Modeling in Neuro-Science	Shoja Chenouri, *University of Waterloo (Canada)* Paul Marriott, *University of Waterloo (Canada)*
SS-MMPF	Mathematical Modeling of Protein Flexibility	Forbes Burkowski, *University of Waterloo (Canada)* Henry Wolkowicz, *University of Waterloo (Canada)*
SS-MMSS	Mathematical Models in Social Sciences	Marc Kilgour, *Wilfrid Laurier University (Canada)*
SS-MNANO	Mathematical Models for Nanoscience and Nanotechnology	Zoran Miskovic, *University of Waterloo (Canada)* A. Hamed Majedi, *University of Waterloo (Canada)*
SS-NMMM	Numerical Methods for Mathematical Models Based on ODEs, PDEs, Integral and Integro-Differential Equations	Atife Caglar, *University of Wisconsin - Green Bay (USA)* Faranak Pahlevani, *Penn State University, Abington College (USA)*
SS-PMHP	Physics and Mathematics of the Human Placenta	Dmitri Vvedensky, *Imperial College, London (UK)* Carolyn Salafia, *Placental Analytics LLC (USA)*
SS-SCPD	Mathematical Modeling for Supply Chain and Product Development in High-Tech Industries	Amy H. I. Lee, *Chung Hua University (Taiwan)*
SS-SDAEA	New Developments in Numerical Methods and Software for Differential-Algebraic Equations and Applications	Andreas Griewank, *Humboldt-Universität zu Berlin (Germany)* John Pryce, *Cranfield University (UK)* Ned Nedliakov, *McMaster University (Canada)*
SS-SGT	Structured Graph Theory and Applications	Ching Hoang, *Wilfrid Laurier University (Canada)* Kathie Cameron, *Wilfrid Laurier University (Canada)*
SS-SMES	Statistical Modeling in Environmental Sciences	Yulia Gel, *University of Waterloo (Canada)* Sylvia Esterby, *University of British Columbia - Okanagan (Canada)*
SS-SND	Symmetry in Nonlinear Dynamics: Applications and Numerics	Pietro-Luciano Buono, *UOIT (Canada)* Manuele Santoprete, *Wilfrid Laurier University (Canada)* Cristina Stoica, *Wilfrid Laurier University (Canada)*
SS-SSD	Progress and Prospects in Model-Based Scientific Software Development	Christopher Anand, *McMaster University (Canada)* Spencer Smith, *McMaster University (Canada)* Diane Kelly, *Royal Military College (Canada)* Jacques Carette, *McMaster University (Canada)*
SS-TAF	Theory and Applications in Finance	Joe Campolieti, *Wilfrid Laurier University (Canada)* Nick Costanzino, *Wilfrid Laurier University (Canada)* Roman Makarov, *Wilfrid Laurier University (Canada)*
SS-VS	Numerical Methods for First and Second Order Fully Nonlinear PDEs	Xiaobing Feng, *University of Tennessee (USA)* Chiu-Yen Kao, *The Ohio State University (USA)* Ying Wang, *University of Minnesota (USA)*

Agenda of Sessions – Monday, July 25

	Room BA101	Room BA102	Room BA112	Room BA113	Room BA201
8:30 - 9:00	**AMMCS Conference Opening** *BA201* **Abby Goodrum** *Vice President: Research, Wilfrid Laurier University* **David Vaughan** *Associate Dean: Priorities & Planning, Faculty of Science, Wilfrid Laurier University*				
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Barbara Keyfitz* ***Mathematical Modeling in Mathematical Handwriting Recognition*** **Stephen Watt** *The University of Western Ontario (Canada) – Abstract & Biography - p. 6*				
10:00 - 10:30	**Coffee Break** *BA hallways*				
10:30 - 12:30	**SS-HPC I** High Performance Computing: From Models of Computation to Applications I	**SS-CNT I** Computational Number Theory I	**SS-DAE I** Design and Analysis of Experiments and Statistical Methods I	**SS-MNANO I** Mathematical Models for Nanoscience and Nanotechnology I	
12:30 - 14:00	**Lunch**				
14:00 - 15:00	**Plenary Talk** *BA201 – Chair: Ilias Kotsireas* ***Group Structures of Elliptic Curves: Statistics, Heuristics, Algorithms*** **Igor Shparlinski** *MacQuarie University (Australia) – Abstract & Biography - p. 7*				
15:15 - 16:45	**CS-ENVIRONMENT** Mathematical Modeling in Environmental Sciences and Models for Complex Media	**SS-CNT II** Computational Number Theory II	**SS-CA** Differential and Integral Symbolic-Numeric Algorithms	**SS-EHT** Energy Harvesting Technologies	**CS-BSM I** Mathematics and Computation in Biological Sciences and Medicine I
16:45 - 17:15	**Coffee Break** *BA hallways*				
17:15 - 18:45	**CS-ENVIRONMENT** Mathematical Modeling in Environmental Sciences and Models for Complex Media *cont'*	**SS-CNT II** Computational Number Theory II *cont'*	**SS-CA** Differential and Integral Symbolic-Numeric Algorithms *cont'*		**CS-BSM I** Mathematics and Computation in Biological Sciences and Medicine I *cont'*

Agenda of Sessions – Monday, July 25

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
8:30 - 9:00	**AMMCS Conference Opening** *BA201* **Abby Goodrum** *Vice President: Research, Wilfrid Laurier University* **David Vaughan** *Associate Dean: Priorities & Planning, Faculty of Science, Wilfrid Laurier University*				
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Barbara Keyfitz* ***Mathematical Modeling in Mathematical Handwriting Recognition*** **Stephen Watt** *The University of Western Ontario (Canada) – Abstract & Biography - p. 6*				
10:00 - 10:30	**Coffee Break** *BA hallways*				
10:30 - 12:30	**SS-IM I** Industrial Mathematics I	**SS-CMHP I** Computational Methods for Hyperbolic Problems I	**SS-HDS I** Recent Progress on Hybrid Dynamical Systems I	**SS-MCMI I** Mathematical and Computational Modeling of Influenza I	**SS-SDAEA I** New Developments in Numerical Models and Software for Differential-Algebraic Equations and Applications I
12:30 - 14:00	**Lunch**				
14:00 - 15:00	**Plenary Talk** *BA201 – Chair: Ilias Kotsireas* ***Group Structures of Elliptic Curves: Statistics, Heuristics, Algorithms*** **Igor Shparlinski** *MacQuarie University (Australia) – Abstract & Biography - p. 7*				
15:15 - 16:45	**SS-IM II** Industrial Mathematics II	**SS-CMHP II** Computational Methods for Hyperbolic Problems II	**SS-HDS II** Recent Progress on Hybrid Dynamical Systems II	**SS-AQT** Applied Queueing Theory	**SS-SDAEA II** New Developments in Numerical Models and Software for Differential-Algebraic Equations and Applications II
16:45 - 17:15	**Coffee Break** *BA hallways*				
17:15 - 18:45	**SS-IM II** Industrial Mathematics II *cont'*	**SS-CMHP II** Computational Methods for Hyperbolic Problems II *cont'*	**SS-HDS II** Recent Progress on Hybrid Dynamical Systems II *cont'*	**SS-AQT** Applied Queueing Theory *cont'*	**SS-SDAEA II** New Developments in Numerical Models and Software for Differential-Algebraic Equations and Applications II *cont'*

Agenda of Sessions – Tuesday, July 26

	Room BA101	Room BA102	Room BA112	Room BA113	Room BA201
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Suzanne Lenhart* ***Mathematical Analysis of Neuronal Network Dynamics*** **David Cai** *Courant Institute, New York University (USA) – Abstract & Biography - p. 8*				
10:00 - 10:30	**Poster Session*** *BA110 and BA111* and **Coffee Break** *BA hallways*				
10:30 - 12:30	**SS-HPC II** High Performance Computing: From Models of Computation to Applications II		**SS-DAE II** Design and Analysis of Experiments and Statistical Methods II	**SS-MNANO II** Mathematical Models for Nanoscience and Nanotechnology II	
12:30 - 14:00	**Lunch**				
14:00 - 15:00	**Plenary Talk** *BA201 – Chair: Chi-Wang Shu* ***Lower Bounds on the Navier-Stokes Singular Set*** **Walter Craig** *McMaster University (Canada) – Abstract & Biography - p. 10*				
15:15 - 16:45	**CS-CPC I** Computational Physics and Chemistry I	**SS-CNT III** Computational Number Theory III	**SS-SCPD** Mathematical Modeling of Supply Chain and Product Development in High-Tech Industries		**CS-BSM II** Mathematics and Computation in Biological Sciences and Medicine II
16:45 - 17:15	**Poster Session*** *BA110 and BA111* and **Coffee Break** *BA hallways*				
17:15 - 18:45	**CS-CPC I** Computational Physics and Chemistry I *cont'*	**SS-CNT III** Computational Number Theory III *cont'*	**SS-SCPD** Mathematical Modeling of Supply Chain and Product Development in High-Tech Industries *cont'*		**CS-BSM II** Mathematics and Computation in Biological Sciences and Medicine II *cont'*

*Posters will be on display in rooms BA110 and BA111 for the duration of the conference. Authors will be available for discussion during the tuesday poster sessions.

Agenda of Sessions – Tuesday, July 26

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Suzanne Lenhart* ***Mathematical Analysis of Neuronal Network Dynamics*** **David Cai** *Courant Institute, New York University (USA) – Abstract & Biography - p. 8*				
10:00 - 10:30	**Poster Session*** *BA110 and BA111* and **Coffee Break** *BA hallways*				
10:30 - 12:30	**SS-SSD I** Progress and Prospects in Model-Based Scientific Software Development I	**SS-CMHP III** Computational Methods for Hyperbolic Problems III	**SS-HONM I** High Order Numerical Methods for Partial Differential Equations I	**SS-CDPB I** Complex Dynamics of Population Behaviour with Impact to Socio-Economic Issues I	**SS-MBP I** Modeling in Biophysics I
12:30 - 14:00	**Lunch**				
14:00 - 15:00	**Plenary Talk** *BA201 – Chair: Chi-Wang Shu* ***Lower Bounds on the Navier-Stokes Singular Set*** **Walter Craig** *McMaster University (Canada) – Abstract & Biography - p. 10*				
15:15 - 16:45	**CS-FINANCE I** Financial Mathematics and Computation I	**SS-CMHP IV** Computational Methods for Hyperbolic Problems IV	**SS-HONM II** High Order Numerical Methods for Partial Differential Equations II	**SS-MCMI II** Mathematical and Computational Modeling of Influenza II	**SS-NMMM I** Numerical Methods for Mathematical Models Based on ODEs, PDEs, Integral and Integro-Differential Equations I
16:45 - 17:15	**Poster Session*** *BA110 and BA111* and **Coffee Break** *BA hallways*				
17:15 - 18:45	**CS-FINANCE I** Financial Mathematics and Computation I *cont'*	**SS-CMHP IV** Computational Methods for Hyperbolic Problems IV *cont'*	**SS-HONM II** High Order Numerical Methods for Partial Differential Equations II *cont'*	**SS-MCMI II** Mathematical and Computational Modeling of Influenza II *cont'*	**SS-NMMM I** Numerical Methods for Mathematical Models Based on ODEs, PDEs, Integral and Integro-Differential Equations I *cont'*

*Posters will be on display in rooms BA110 and BA111 for the duration of the conference. Authors will be available for discussion during the tuesday poster sessions.

Agenda of Sessions – Wednesday, July 27

	Room BA101	Room BA102	Room BA112	Room BA113	Room BA201
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: David Cai* ***Mixing it up: Discrete and Continuous Optimal Control for Biological Models*** **Suzanne Lenhart** *University of Tennessee, Knoxville (USA) – Abstract & Biography - p. 11*				
10:00 - 10:30	**Coffee Break** *BA hallways*				
10:30 - 12:30	**CS-CPC II** Computational Physics and Chemistry II	**SS-VS I** Numerical Methods for First and Second Order Fully Nonlinear PDEs I	**SS-SSD II** Progress and Prospects in Model-Based Scientific Software Development II	**SS-MMPF** Mathematical Modeling of Protein Flexibility	**SS-SMES** Statistical Modeling in Environmental Sciences
12:30 - 13:00	**Conference Photo Shoot** *meet in front of BA*				
13:00 - 14:00	**Lunch**				
14:00 - 16:00	**Maplesoft Product Demonstrations*** *BA206 and BA207*				

* Industrial Applications of Mathematics Tools for Engineering Modeling

Maplesoft has developed software tools for math, modeling and simulation. Maple is typically used to model continuum systems, while MapleSim is designed to model lumped parameter systems. These tools are widely accepted across the entire spectrum of engineering, mathematics, science, and finance. This session will give delegates hands-on experience with both tools, with an emphasis on their practical application. Delegates will discover how Maple is used in industry to simulate and document several engineering systems, which will involve the solution of ordinary and partial-differential equations. Additionally, delegates will learn how MapleSim is used to model systems of interacting mechanical, hydraulic and electrical components.

Refreshments will be provided courtesy of Maplesoft

Agenda of Sessions – Wednesday, July 27

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: David Cai* ***Mixing it up: Discrete and Continuous Optimal Control for Biological Models*** **Suzanne Lenhart** *University of Tennessee, Knoxville (USA) – Abstract & Biography - p. 11*				
10:00 - 10:30	**Coffee Break** *BA hallways*				
10:30 - 12:30	**CS-FINANCE II** Financial Mathematics and Computation II	**CS-APMRE** Applied Problems and Methods in Research and Education	**SS-MBP II** Modeling in Biophysics II	**SS-CDPB II** Complex Dynamics of Population Behaviour with Impact to Socio-Economic Issues II	**SS-NMMM II** Numerical Methods for Mathematical Models Based on ODEs, PDEs, Integral and Integro-Differential Equations II
12:30 - 13:00	**Conference Photo Shoot** *meet in front of BA*				
13:00 - 14:00	**Lunch**				
14:00 - 16:00	**Maplesoft Product Demonstrations*** *BA206 and BA207*				

Agenda of Sessions – Thursday, July 28

	Room BA101	Room BA102	Room BA112	Room BA113	Room BA201
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Roderick Melnik* ***Random Matrix Theory in Applied Mathematics, Modeling, and Computational Science*** **Alan Edelman** *Massachusetts Institute of Technology (USA) – Abstract & Biography - p. 12*				
10:00 - 10:15	**Coffee Break** *BA hallways*				
10:15 - 12:15	**SS-CC I** Computational Chemistry I	**CS-MODELING I** Partial Differential and Integral Equations in Mathematical Modeling I	**SS-CNP** Computational Nanophotonics		**SS-MB I** Recent Advances in Mathematical Biology I
12:15 - 13:45	**Lunch**				
13:45 - 14:45	**Plenary Talk** *BA201 – Chair: Alberto Bressan* ***Inverse Lax-Wendroff Procedure for Numerical Boundary Conditions of Hyperbolic Equations*** **Chi-Wang Shu** *Brown University (USA) – Abstract & Biography - p. 13*				
15:00 - 16:30	**SS-BNANO** Computational Bionanotechnology	**SS-MMNS** Mathematical Modeling in Neuro-Science	**SS-SND I** Symmetry in Nonlinear Dynamics: Applications and Numerics I	**SS-SGT** Structured Graph Theory and Applications	**CS-DSDE I** Applications of Dynamical Systems and Differential Equations I
16:30 - 16:45	**Coffee Break** *BA hallways*				
16:45 - 18:15	**SS-BNANO** Computational Bionanotechnology *cont'*	**SS-MMNS** Mathematical Modeling in Neuro-Science *cont'*	**SS-SND I** Symmetry in Nonlinear Dynamics: Applications and Numerics I *cont'*	**SS-SGT** Structured Graph Theory and Applications *cont'*	**CS-DSDE I** Applications of Dynamical Systems and Differential Equations I *cont'*
19:30 - 22:00	**Conference Banquet** *details: p. 3, map: p. 58*				

Agenda of Sessions – Thursday, July 28

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Roderick Melnik* ***Random Matrix Theory in Applied Mathematics, Modeling, and Computational Science*** **Alan Edelman** *Massachusetts Institute of Technology (USA) – Abstract & Biography - p. 12*				
10:00 - 10:15	**Coffee Break** *BA hallways*				
10:15 - 12:15	**SS-VS II** Numerical Methods for First and Second Order Fully Nonlinear PDEs II	**SS-MMSS I** Mathematical Models in Social Sciences I	**SS-EG** Evolutionary Games in Biology and Ecology		
12:15 - 13:45	**Lunch**				
13:45 - 14:45	**Plenary Talk** *BA201 – Chair: Alberto Bressan* ***Inverse Lax-Wendroff Procedure for Numerical Boundary Conditions of Hyperbolic Equations*** **Chi-Wang Shu** *Brown University (USA) – Abstract & Biography - p. 13*				
15:00 - 16:30	**CS-MECHE I** Computational Mechanics and Engineering I	**SS-MMSS II** Mathematical Models in Social Sciences II	**SS-AAIP I** Applied Analysis and Inverse Problems I	**SS-PMHP** Physics and Mathematics of the Human Placenta	**SS-TAF I** Theory and Applications in Finance I
16:30 - 16:45	**Coffee Break** *BA hallways*				
16:45 - 18:15	**CS-MECHE I** Computational Mechanics and Engineering I *cont'*	**SS-MMSS II** Mathematical Models in Social Sciences II *cont'*	**SS-AAIP I** Applied Analysis and Inverse Problems I *cont'*	**SS-PMHP** Physics and Mathematics of the Human Placenta *cont'*	**SS-TAF I** Theory and Applications in Finance I *cont'*
19:30 - 22:00	**Conference Banquet** *details: p. 3, map: p. 58*				

Agenda of Sessions – Friday, July 29

	Room BA101	Room BA102	Room BA112	Room BA113	Room BA201
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Huang Huaxiong* ***Kolmogorov Complexity and its Applications in Computer Science*** **Ming Li** *University of Waterloo (Canada) – Abstract & Biography - p. 14*				
10:00 - 10:30	**Coffee Break** *BA hallways*				
10:30 - 12:30	**SS-CC II** Computational Chemistry II	**CS-MODELING II** Partial Differential and Integral Equations in Mathematical Modeling II	**SS-SND II** Symmetry in Nonlinear Dynamics: Applications and Numerics II		**SS-MB II** Recent Advances in Mathematical Biology II
12:30 - 14:00	**Lunch**				
14:00 - 15:00	**Plenary Talk** *BA201 – Chair: Marc Kilgour* ***Dynamic Blocking Problems*** **Alberto Bressan** *Penn State University (USA) – Abstract & Biography - p. 15*				
15:15 - 16:45	**SS-MB III** Recent Advances in Mathematical Biology III	**CS-MODELING III** Partial Differential and Integral Equations in Mathematical Modeling III	**SS-SND III** Symmetry in Nonlinear Dynamics: Applications and Numerics III		**CS-DSDE II** Applications of Dynamical Systems and Differential Equations II
16:45 - 17:15	**Coffee Break** *BA hallways*				
17:15 - 18:45	**SS-MB III** Recent Advances in Mathematical Biology III *cont'*	**CS-MODELING III** Partial Differential and Integral Equations in Mathematical Modeling III *cont'*	**SS-SND III** Symmetry in Nonlinear Dynamics: Applications and Numerics III *cont'*		**CS-DSDE II** Applications of Dynamical Systems and Differential Equations II *cont'*
19:00 - 19:15	**Presentation of Student Awards** *BA101*				

Agenda of Sessions – Friday, July 29

	Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
9:00 - 10:00	**Plenary Talk** *BA201 – Chair: Huang Huaxiong* ***Kolmogorov Complexity and its Applications in Computer Science*** **Ming Li** *University of Waterloo (Canada) – Abstract & Biography - p. 14*				
10:00 - 10:30	**Coffee Break** *BA hallways*				
10:30 - 12:30	**SS-CBSG** Connections Between Statistics and Genetics	**CS-CACO I** Computational Algebra, Combinatorics, and Optimization I	**SS-HAM** Homogenization and Applications in the Modeling of Nanoplasmonic Sensors	**SS-LSCA** Large Scale Computer Algebra Applications	
12:30 - 14:00	**Lunch**				
14:00 - 15:00	**Plenary Talk** *BA201 – Chair: Marc Kilgour* ***Dynamic Blocking Problems*** **Alberto Bressan** *Penn State University (USA) – Abstract & Biography - p. 15*				
15:15 - 16:45	**CS-MECHE II** Computational Mechanics and Engineering II	**CS-CACO II** Computational Algebra, Combinatorics, and Optimization II	**SS-AAIP II** Applied Analysis and Inverse Problems II	**SS-CC III** Computational Chemistry III	**SS-TAF II** Theory and Applications in Finance II
16:45 - 17:15	**Coffee Break** *BA hallways*				
17:15 - 18:45	**CS-MECHE II** Computational Mechanics and Engineering II *cont'*	**CS-CACO II** Computational Algebra, Combinatorics, and Optimization II *cont'*	**SS-AAIP II** Applied Analysis and Inverse Problems II *cont'*	**SS-CC III** Computational Chemistry III *cont'*	**SS-TAF II** Theory and Applications in Finance II *cont'*
19:00 - 19:15	**Presentation of Student Awards** *BA101*				

Monday, July 25 – 10:30 - 12:30

Room BA101

SS-HPC I
High Performance Computing: From Models of Computation to Applications I

Session Chairs:
Marc Moreno Maza and Yuzhen Xie, University of Western Ontario (Canada)

10:30 - 11:00 • #371
Exploiting the GPU for Multiple Swarm Collaborative PSO for Task Scheduling Cloud Environment
Steven Solomon, Parimala Thulasiraman, and Ruppa Thulasiram, University of Manitoba (Canada)

11:00 - 11:30 • #398
Solving Bivariate Polynomial Systems on a GPU
Marc Moreno Maza and Wei Pan, University of Western Ontario (Canada)

11:30 - 12:00 • #400
Determinant Computation on the GPU using the Condensation Method
Sardar Haque and Marc Moreno Maza, University of Western Ontario (Canada)

12:00 - 12:30 • #73
Parallel Evolutionary Algorithms, for Solving a Free Boundary Problem
Abdelkrim Chakib[1], Abdeljalil Nachaoui[2], and Mourad Nachaoui[3], [1]Université Sultan Moulay Slimane (Morocco) [2] CNRS Université de Nantes (France) [3]Université de Nantes (France)

Room BA102

SS-CNT I
Computational Number Theory I

Session Chair:
Kevin Hare
University of Waterloo (Canada)

10:30 - 11:00 • #21
On a Class of Polynomials Related to Barker Sequences
Stephen Choi[1], Peter Borwein[1], and Jonas Jankauskas[2], [1]Simon Fraser University (Canada) [2]Vilnius University (Lithuania)

11:00 - 11:30 • #40
The Prouhet-Tarry-Escott Problem for Gaussian Integers
Timothy Caley, University of Waterloo (Canada)

11:30 - 12:00 • #52
Some Extensions of the Lucas Functions
Hugh Williams, University of Calgary (Canada)

12:00 - 12:30 • #55
Prime Number Races: an Asymptotic Formula for the Densities
Greg Martin, University of British Columbia (Canada)

Room BA112

SS-DAE I
Design and Analysis of Experiments and Statistical Methods I

Session Chair:
Krishnasamy Arasu
Wright State University (USA)

10:30 - 11:00 • #20
Using LMS Algorithm for Estimating Gaussian Probability Distribution
Abdelkader Maddi[1], Abderrezak Guessoum[1], and Daoued Berkani[2], [1]University of Blida (Algeria) [2]Polytechnic School of El Harrach (Algeria)

11:00 - 11:30 • #65
Maximum Likelihood Estimator for Parameters of Fractional Stable Distribution
Viacheslav Saenko, Ulyanovsk State University (Russian Federation)

11:30 - 12:00 • #358
Robust Designs for Three Commonly Used Nonlinear Models
Arnold Chen and Xiaojian Xu, Brock University (Canada)

12:00 - 12:30 • #253
On Simulating Branching Processes Using Mixed Distributions
Behrouz Fathi-Vajargah and Mojtaba Moradi, University of Guilan (Iran)

Room BA113

SS-MNANO I
Mathematical Models for Nanoscience and Nanotechnology I

Session Chair:
Zoran Miscovic
University of Waterloo (Canada)

10:30 - 11:00 • #160
Correlations in Superconducting Nano-Wires
Amir Jafari Salim and Hamed Majedi, UW and IQC (Canada)

11:00 - 11:30 • #182
Mathematical Modeling of Single Semiconductor Quantum Dots
Milad Khoshnegar and Amir Hamed Majedi, University of Waterloo (Canada)

11:30 - 12:00 • #187
Nonequilibrium Dynamics of a Superconducting Plasmonic Channel
Amin Eftekharian and A. Hamed Majedi, University of Waterloo (Canada)

12:00 - 12:30 • #236
Numerical Analysis of Parametric and Nonlinear Wave Interaction in Discrete Josephson Transmission Line
Hamid Reza Mohebbi and A. Hamed Majedi, University of Waterloo (Canada)

Room BA201

Room BA202

SS-IM I
Industrial Mathematics I

Session Chair:
Sean Bohun
UOIT (Canada)

10:30 - 11:00 • #299
Worst Case Analysis for Deterministic Online Algorithm in Capacitated Lot-Sizing Problem
Ekaterina Kaganova, University of Paderborn (Germany)

11:00 - 11:30 • #273
Radiation Dose Planning and Portfolio Management
Matt Davison[1], Harald Keller[2], and Dae-Ro Kim[1], [1]University of Western Ontario (Canada) [2]Princess Margaret Hospital (Canada)

11:30 - 12:00 • #418
Understanding Buoyant Miscible Displacement Flows in Near Horizontal Ducts I
Ian Frigaard[1], Seyed-Mohammad Taghavi[1], Kamran Alba[1], Thomas Seon[2], Kerstin Wielage-Burchard[1], and Mark Martinez[1], [1]University of British Columbia (Canada) [2]Université Pierre et Marie Curie, Institut d'Alembert (France)

12:00 - 12:30 • #36
Finite Element Approach for Numerical Simulation of Advection-Diffusion Equation
S. Dhawan[1], S. Kapoor[2], S. Kumar[1], and S. Rawat[3], [1]N.I.T.Jalandhar (India) [2]I.I.T.Roorkee (India) [3]Sharda University Greater Noida (India)

Room BA208

SS-CMHP I
Computational Methods for Hyperbolic Problems I

Session Chairs:
Jae-Hun Jung, SUNY Buffalo (USA) and Allen Tesdall, CUNY College of Staten Island (USA)

10:30 - 11:00 • #130
Modeling and Risk Analysis of Volcanic Mass Flows
E Bruce Pitman, SUNY at Buffalo (USA)

11:00 - 11:30 • #119
Numerical Solution of Non-Equilibrium Gaseous Flows Using Hyperbolic Moment Closures
Clinton Groth, University of Toronto (Canada)

11:30 - 12:00 • #14
Convection-Dominated Problems in a Circle Domain
Chang-Yeol Jung[1] and Roger Temam[2], [1]UNIST (Korea) [2]Indiana University (USA)

12:00 - 12:30 • #89
Conservative Discontinuous Galerkin Methods for the Generalized Korteweg-de Vries Equation
Yulong Xing, University of Tennessee and Oak Ridge National Laboratory (USA)

Room BA209

SS-HDS I
Recent Progress on Hybrid and Dynamical Systems I

Session Chair:
Xinzhi Liu
University of Waterloo (Canada)

10:30 - 11:00 • #19
Preservation of Dissipativity Properties with the (θ, γ)-Discretization
Scott Greenhalgh[1], Bernard Brogliato[2], and Vincent Acary[2], [1]University of Guelph (Canada) [2]INRIA (France)

11:00 - 11:30 • #168
Observer for Singularly Perturbed Switched Linear Time-Varying Systems
Moosa Ayati[1], Mohamad Alwan[1], Xinzhi Liu[1], and Hamid Khaloozadeh[2], [1]University of Waterloo (Canada) [2]K. N. Toosi University of Technology (Iran)

11:30 - 12:00 • #174
Stability Results for Nonlinear Stochastic Impulsive Systems with Time Delay
Mohamad Alwan, Xinzhi Liu, and Wei-Chau Xie, University of Waterloo (Canada)

12:00 - 12:30 • #186
Controllability and Observability of Linear Time-Varying Impulsive Systems on Time Scales
Kexue Zhang[1] and Xinzhi Liu[2], [1]Shandong University (China) [2]University of Waterloo (Canada)

Room BA210

SS-MCMI I
Mathematical and Computational Modeling of Influenza I

Session Chair:
Hana Dobrovolny
Ryerson University (Canada)

10:30 - 11:00 • #50
The Impact of Vaccination During the 2009/2010 pH1N1 Epidemic in Montreal, Quebec, Canada
Mike Delorme[1], Jonathan Dushoff[2], and David Buckeridge[3], [1]Region of Waterloo Public Health/McMaster University (Canada) [2]McMaster University (Canada) [3]McGill University (Canada)

11:00 - 11:30 • #367
A Simulation Platform to Enhance Pandemic Preparedness and Responses to Future Pandemics in Ontario
Marija Zivkovic Gojovic, Beate Sander, Ashleigh Tuite, and Natasha Crowcroft, OAHPP (Canada)

11:30 - 12:00 • #97
The Impact of Individual and Social Psychology on the Effectiveness of Vaccination Against Infectious Diseases
Chad Wells[1], Jean Michel Tchuenche[1], Lauren Ancel-Meyers[2], Alison Galvani[3], and Chris Bauch[1], [1]University of Guelph (Canada) [2]University of Texas (USA) [3]Yale University (USA)

12:00 - 12:30 • #121
Mechanistic Modelling of the Three Mortality Waves in the 1918 Influenza Pandemic in the UK
Daihai He[1], Jonathan Dushoff[2], Troy Day[3], Junling Ma[4], and David J.D. Earn[2], [1]McMaster Univesity (Canada) [2]McMaster University (Canada) [3]Queen's University (Canada) [4]University of Victoria (Canada)

Room BA211

SS-SDAEA I
New Developments in Numerical Models and Software for Differential-Algebraic Equations and Applications I

Session Chair:
Andreas Griewank
Humboldt-Universität zu Berlin (Germany)

10:30 - 11:00 • #82
Interval Bounds on the Solutions of Semi-Explicit Index-One DAEs
Joseph Scott and Paul Barton, Massachusetts Institute of Technology (USA)

11:00 - 11:30 • #91
A Numerical Method with Regularization and Multiscale Properties for Integrating DAEs
Nigam Parida and Soumyendu Raha, SERC, Indian Institute of Science (India)

11:30 - 12:00 • #133
DAE Optimization in Integrated Process Design and Control
Christopher Swartz, McMaster University (Canada)

12:00 - 12:30 • #203
DAE Index Calculation and Consistent Initialization of Multiphysical Network Models
Caren Tischendorf, University of Cologne (Germany)

Monday, July 25 – 15:15 - 16:45

Room BA101

CS-ENVIRONMENT
Mathematical Modeling in Environmental Sciences and Models for Complex Media

Session Chair:
Rakesh Dhote
University of Toronto (Canada)

15:15 - 15:45 • #172
A New Cell-Centred Finite Difference Scheme for CFD Simulations
Ali Salih and Ronald Barron, University of Windsor (Canada)

15:45 - 16:15 • #361
Time-Dynamic Modeling of Multi-Phase Flow in Volcanic Conduits
Alyssa Cederman[1], Anthony Grisafi[2], Eric Mikida[2], E Bruce Pitman[2], and Jude Sabato[1], [1]Buffalo State College (USA) [2]SUNY at Buffalo (USA)

16:15 - 16:45 • #110
Effects of Pressure Stress Work and Viscous Dissipation in Mixed Convection Flow along a Vertical Flat Plate
Md Abdus Samad Bhuiyan[1] and Rasel Biswas[2], [1]Brock University (Canada) [2]Memorial University (Canada)

Room BA102

SS-CNT II
Computational Number Theory II

Session Chair:
Timothy Caley
University of Waterloo (Canada)

15:15 - 15:45 • #58
Investigation of Lower Order Terms in the Moments of L-Functions
Matthew Alderson, University of Waterloo (Canada)

15:45 - 16:15 • #262
On the Density of Abundant Numbers
Mitsuo Kobayashi, Cal Poly Pomona (USA)

16:15 - 16:45 • #170
Computing Irrationality Measures
Mark Bauer[1] and Mike Bennett[2], [1]University of Calgary (Canada) [2]University of British Columbia (Canada)

Room BA112

SS-CA
Differential and Integral Symbolic-Numeric Algorithms

Session Chair:
Ekaterina Shemyakova
University of Western Ontario (Canada)

15:15 - 15:45 • #287
Application of Row-Reduction of Operator Matrices to the Computation of pi-flat Outputs in Control Theory
Johannes Middeke[1] and Felix Antritter[2], [1]Johannes Kepler University (Austria) [2]Universitaet der Bundeswehr Muenchen (Germany)

15:45 - 16:15 • #292
Approximation of Moutard Equations by Integrable PDEs
Ekaterina Shemyakova, University of Western Ontario (Canada)

16:15 - 16:45 • #401
Stieltjes Integral Transforms: From Approximate to Exact Values
German Kalugin and David Jeffrey, University of Western Ontario (Canada)

Room BA113

SS-EHT
Energy Harvesting Technologies

Session Chair:
Armaghan Salehian
University of Waterloo (Canada)

15:15 - 15:45 • #175
Modeling and Evaluation of a Hybrid Piezo-Electromagnetic Vibrating Energy Harvesting Device
Torsten Reuschel[1] and Armaghan Salehian[2], [1]Hamburg University of Technology (Germany) [2]University of Waterloo (Canada)

15:45 - 16:15 • #351
Horizontally-Aligned Springless Energy Harvester
Mohamed Bendame[1], Karim Elrayes[1], Eihab Abdel-Rahman[1], Raafat Mansoor[2], and Ehab El-Saadany[3], [1]University of Waterloo (Canada) [2]IEEE, Fellow (Canada) [3]IEEE, Senior Member (Canada)

16:15 - 16:45 • #309
Thermally-Robust Asymmetric Resonators for Energy Harvesting Applications
Pezhman Hassanpour, Patricia Nieva, and Amir Khajepour, University of Waterloo (Canada)

Room BA201

CS-BSM I
Mathematics and Computation in Biological Sciences and Medicine I

Session Chair:
Alex Zhukov
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #80
Towards Inter- and Intra- Cellular Protein Interaction Analysis: Applying the Betweenness Centrality Graph Measure for Node Importance
Alan Barton and Arsalan Haqqani, National Research Council (Canada)

15:45 - 16:15 • #124
A Turing Reaction-Diffusion Model for Human Cortical Folding Patterns and Cortical Pattern Malformations
Monica Hurdal and Deborah Striegel, Florida State University (USA)

16:15 - 16:45 • #138
Dynamic Modeling of Metabolism in Pancreatic β-Cells
Rahul[1], Adam Stinchcombe[2], Jamie Joseph[1], and Brian Ingalls[1], [1]University of Waterloo (Canada) [2]New York University (USA)

Monday, July 25 – 15:15 - 16:45

Room BA202

SS-IM II
Industrial Mathematics II

Session Chair:
Sean Bohun
UOIT (Canada)

15:15 - 15:45 • #405
Dynamic Model Development and Parameter Estimation for Nylon 66 Polycondensation and Thermal Degradation at Industrial Operating Conditions
Hadiseh Karimi, Mark Schaffer, and Kim McAuley, Queen's University (Canada)

15:45 - 16:15 • #141
Numerical Model for Magnetized Target Fusion
Xavier Lavocat-Dubuis[1], Pascal Turbis[1], Marc Laforest[1], Emmanuel Lorin[2], and Frédéric Sirois[1], [1]Polytechnique Montreal (Canada) [2]Carleton university (Canada)

16:15 - 16:45 • #185
The Augmented Lagrangian Method Applied to Unsolvable Power Flows
Mario C. Zambaldi[1], Juliano B. Francisco[1], and Luciano V. Barboza[2], [1]Federal University of Santa Catarina (Brazil) [2]Sul-rio-grandense Federal Institute (Brazil)

Room BA208

SS-CMHP II
Computational Methods for Hyperbolic Problems II

Session Chairs:
Jae-Hun Jung, SUNY Buffalo (USA) and Allen Tesdall, CUNY College of Staten Island (USA)

15:15 - 15:45 • #419
A New Look at Singular Shocks
Barbara Keyfitz, The Ohio State University (USA)

15:45 - 16:15 • #101
Central Discontinuous Galerkin Methods for Ideal MHD Equations with the Exactly Divergence-Free Magnetic Field
Fengyan Li and Liwei Xu, Rensselaer Polytechnic Institute (USA)

16:15 - 16:45 • #198
Efficient High-Order Time Integration Algorithms for Transport Simulations
Misun Min and Paul Fischer, Argonne National Laboratory (USA)

Room BA209

SS-HDS II
Recent Progress on Hybrid and Dynamical Systems II

Session Chair:
Xinzhi Liu
University of Waterloo (Canada)

15:15 - 15:45 • #201
Intermittent Impulsive Synchronization of Coupled Chaotic Systems Subject to Delay
Xinzhi Liu, Xuemin Shen, Hongtao Zhang, and Jun Liu, University of Waterloo (Canada)

15:45 - 16:15 • #204
Designing Stochastic Adaptive Impulsive Observer for Noisy Uncertain Nonlinear Impulsive Systems
Moosa Ayati[1], Mohamad Alwan[1], Xinzhi Liu[1], and Hamid Khaloozadeh[2], [1]University of Waterloo (Canada) [2]K. N. Toosi University of Technology (Iran)

16:15 - 16:45 • #211
Stability of Stochastic Switched SIRS Models
Xiaoying Meng[1], Xinzhi Liu[2], and Feiqi Deng[1], [1]South China University of Technology (China) [2]University of Waterloo (Canada)

Room BA210

SS-AQT
Applied Queueing Theory

Session Chair:
Douglas Woolford
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #70
Level Crossing Analysis of a Renewal Problem
Percy Brill, University of Windsor (Canada)

15:45 - 16:15 • #283
Two Unordered Queues
Myron Hlynka, University of Windsor (Canada)

16:15 - 16:45 • #57
Delays at Signalised Intersections with Exhaustive Traffic Control
Marko Boon[1], Ivo Adan[1], Erik Winands[2], and Douglas Down[3], [1]Technical University of Eindhoven (Netherlands) [2]VU University (Netherlands) [3]McMaster University (Canada)

Room BA211

SS-SDAEA II
New Developments in Numerical Models and Software for Differential-Algebraic Equations and Applications II

Session Chair:
Ned Nedialkov
McMaster University (Canada)

15:15 - 15:45 • #39
Pointwise Numerical Index Determination of Unstructured DAEs
René Lamour, Humboldt-University (Germany)

15:45 - 16:15 • #112
A Matlab Tool for Structural Analysis of DAEs
Nedialko Nedialkov, McMaster University (Canada)

16:15 - 16:45 • #46
Pryce Pre-analysis Adapted to some DAE Solvers
Truong Nguyen-Ba, Rémi Vaillancourt, and Hemza Yagoub, University of Ottawa (Canada)

Monday, July 25 – 17:15 - 18:45

Room BA101	Room BA102	Room BA112	Room BA113	Room BA201
CS-ENVIRONMENT Mathematical Modeling in Environmental Sciences and Models for Complex Media	**SS-CNT II** Computational Number Theory II	**SS-CA** Differential and Integral Symbolic-Numeric Algorithms		
Session Chair: Rakesh Dhote *University of Toronto (Canada)*	**Session Chair**: Timothy Caley *University of Waterloo (Canada)*	**Session Chair**: Ekaterina Shemyakova *University of Western Ontario (Canada)*		
17:15 - 17:45 • #142 **Generating Space-Time Auto-Correlated Fields on the Sphere** *Lubos Spacek and Martin Charron, Environment Canada (Canada)*	17:15 - 17:45 • #117 **A Proof of a Conjecture Concerning** $\zeta(2j+1)/\pi^{2j+1}$ *Matilde Lalin[1] and Mathew Rogers[2], [1]Universite de Montreal (Canada) [2]University of Illinois at Urbana Champaign (USA) / Universite de Montreal (Canada)*	17:15 - 17:45 • #304 **Numerically Stable Sparse Interpolation** *Mark Giesbrecht and Daniel Roche, University of Waterloo (Canada)*		
17:45 - 18:15 • #388 **Heat and Moisture Transport in Fibrous Porous Media with Condensation/Evaporation and Fibre Absorption, Modeling and Analysis** *Buyang Li and Weiwei Sun, City University of Hong Kong (Hong Kong)*	17:45 - 18:15 • #167 **The Distance to an Irreducible Polynomial** *Michael Filaseta[1] and Michael Mossinghoff[2], [1]University of South Carolina (USA) [2]Davidson College (USA)*	17:45 - 18:15 • #363 **Using Approximate GCDs in Integral Transform Methods** *Stephen Watt, University of Western Ontario (Canada)*		
	18:15 - 18:45 • #387 **Padé Approximates and the Riemann Hypothesis** *Peter Borwein, Simon Fraser University (Canada)*			

Monday, July 25 – 17:15 - 18:45

Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
	SS-CMHP II Computational Methods for Hyperbolic Problems II	**SS-HDS II** Recent Progress on Hybrid and Dynamical Systems II	**SS-AQT** Applied Queueing Theory	**SS-SDAEA II** New Developments in Numerical Models and Software for Differential-Algebraic Equations and Applications II
	Session Chairs: *Jae-Hun Jung, SUNY Buffalo (USA) and Allen Tesdall, CUNY College of Staten Island (USA)*	**Session Chair**: Xinzhi Liu *University of Waterloo (Canada)*	**Session Chair**: Douglas Woolford *Wilfrid Laurier University (Canada)*	**Session Chair**: Ned Nedialkov *McMaster University (Canada)*
	17:15 - 17:45 • #51 **A Discontinuous Galerkin Method for Hyperbolic Problems on Cartesian Grids with Embedded Geometries** *Ruibin Qin, University of Waterloo (Canada)*	17:15 - 17:45 • #215 **Stabilization of a Class of Nonlinear Hybrid Systems Using State-Dependent Switching and Impulsive Control** *Peter Stechlinski and Xinzhi Liu, University of Waterloo (Canada)*	17:15 - 17:45 • #42 **A Markovian Queueing Model For Ambulance Offload Delays** *Eman Almehdawe, Elizabeth Jewkes, and Qi-Ming He, University of Waterloo (Canada)*	17:15 - 17:45 • #224 **Use of Quasilinearity in Structural Analysis of DAEs** *John Pryce, Cardiff University (United Kingdom)*
	17:45 - 18:15 • #162 **Some Remarks On the Numerical Approximation of One-Dimensional Non-Conservative Hyperbolic Systems** *Noel Chalmers[1] and Emmanuel Lorin[2], [1]University of Waterloo (Canada) [2]Carleton University (Canada)*	17:45 - 18:15 • #219 **Invariance Principles for Hybrid Systems: Review and New Results** *Jun Liu[1], Xinzhi Liu[2], and Wei-Chau Xie[2], [1]California Institute of Technology (USA) [2]University of Waterloo (Canada)*	17:45 - 18:15 • #154 **A New Paradigm for Priority Patient Selection** *David Stanford[1], Peter Taylor[2], and Ilze Ziedins[3], [1]University of Western Ontario (Canada) [2]University of Melbourne (Australia) [3]University of Auckland (New Zealand)*	17:45 - 18:15 • #323 **Structural DAE Analysis on the Basis of the Computational Graph** *Andreas Griewank and Lutz Lehmann, Humboldt University (Germany)*
	18:15 - 18:45 • #45 **Strong-Stability-Preserving 7-Stage HB Methods** *Truong Nguyen-Ba, Remi Vaillancourt, and Huong Nguyen-Thu, University of Ottawa (Canada)*		18:15 - 18:45 • #410 **A Self-Promoting Priority Model for Transplant Queues** *Steve Drekic[1], David Stanford[2], and Douglas Woolford[1], [1]University of Waterloo (Canada) [2]University of Western Ontario (Canada)*	18:15 - 18:45 • #134 **Solvability Study for Trajectory Prescribed Path Control Problems using Pryce's Structural Analysis** *Javier Lopez, Boeing (Spain)*

Notes

Poster Session
Tuesday, July 26 – 10:00-10:30 and 16:45-17:15

Room BA110

P1 • #199
Evaluating the Effect of Implementing Biologically Realistic Delays on Hepatitis C Kinetics and Associated Estimates of Antiviral Efficacy
Shabnam Shamloo, Benjamin Holder, and Catherine Beauchemin, Ryerson University (Canada)

P2 • #311
Investigating the Impact of Cell Tropism on Influenza Infection Spread in Computer-Simulated Lung Tissue
Nada Younis[1], Ben Holder[2], Hana Dobrovolny[1], and Catherine Beauchemin[1], [1]Ryerson University (Canada) [2]Ryerson Univerity (Canada)

P3 • #317
Characterizing the Efficacy of Combination Antiviral Therapy for the Treatment of Influenza
Mahdi Shahbaba, Hana Dobrovolny, and Catherine Beauchemin, Ryerson University (Canada)

P4 • #354
Faster Short DNA Sequence Alignment with Parallel BWA
Darren Peters, Ping Liang, and Ke Qiu, Brock University (Canada)

P5 • #369
Molecular Dynamics Simulations Indicate that Prothymosin Alpha and Nrf2 Bind to Keap1 via Preformed Structural Elements and Coupled Folding and Binding
Elio Cino[1], Jirasak Wong-Ekkabut[2], Mikko Karttunen[1], and Wing-Yiu Choy[1], [1]University of Western Ontario (Canada) [2]Kasetsart University (Thailand)

P6 • #370
Molecular Dynamics Studies of Transportan Interacting with DPPC Lipid Bilayer
Mohsen Pourmousa and Mikko Karttunen, University of Western Ontario (Canada)

P7 • #94
Modelling Time-Dependent Drug Concentrations with Constant Drug Concentration in Within-Host Models of Influenza
John Palmer, Hana Dobrovolny, and Catherine Beauchemin, Ryerson University (Canada)

P8 • #129
To Estimates of Solutions and the Free Boundary for One Nonlinear Heat Conductivity Equation
Madina Hojimurodova and Mirsaid Aripov, NUU (Uzbekistan)

P9 • #152
Studying the Quality of Noise in a Large Biochemical Reaction Network as a Function of the System Volume
Jukka Intosalmi, Tiina Manninen, Keijo Ruohonen, and Marja-Leena Linne, Tampere University of Technology (Finland)

P10 • #176
Plasmon Excitations in C_{60} by Fast Charged Particle Beams
Chunzhi Li, Frank Goodman, and Zoran Miskovic, University of Waterloo (Canada)

Room BA111

P11 • #416
Optimal Control of West Nile Virus in Mosquito, Birds and Humans
Ahmed Abdelrazec[1], Suzanne Lenhart[2], and Huaiping Zhu[1], [1]York University (Canada), [2]University of Tennessee (USA)

P12 • #349
Modelling the Relation Between Magnetic and Elastic Properties of Magnetic Materials
Niloufar Faghihi[1], Nikolas Provatas[2], Ken Elder[3], Mikko Haataja[4], and Mikko Karttunen[1], [1]University of Western Ontario (Canada) [2]McMaster University (Canada) [3]Oakland University (USA) [4]Princeton University (USA)

P13 • #364
Drift-Oscillatory Steering with the Forward-Reverse Method for Calculating the Potential of Mean Force
Bryan W. Holland[1], Mostafa Nategholeslam[1], Bruno Tomberli[2], and Chris G. Gray[1], [1]University of Guelph (Canada) [2]Brandon University (Canada)

P14 • #362
Numerical Analysis of Time-Dynamic Multi-Phase Flow in Volcanic Conduits
Alyssa Cederman[1], Anthony Grisafi[2], Eric Mikida[2], E Bruce Pitman[2], and Jude Sabato[1], [1]Buffalo State College (USA) [2]SUNY at Buffalo (USA)

P15 • #342
A Hybrid Modeling Approach for Option Pricing
Ehsan Hajizadeh and Abbas Seifi, Amirkabir University of Technology (Iran)

P16 • #212
A Regression Algorithm for Compact Modeling of Multi-Dimensional Problems
Ehsan Rasekh and Niloofar Farnoosh, University of Western Ontario (Canada)

P17 • #206
Supervised Independent Component Analysis Based on Hilbert-Schmidt Independence Criterion
Fatemeh Dorri, University of Waterloo (Canada)

P18 • #63
Posterior Density Estimation for a Class of On-line Quality Control Models
Chang Dorea and Walter Santos, Universidade de Brasilia (Brazil)

P19 • #243
A Multi-Domain Hybrid Method for Head-On Collision of Black-Holes in Particle Limit
Debananda Chakraborty[1], Jae-Hun Jung[1], and Gaurav Khanna[2], [1]State University of New York at Buffalo (USA) [1]University of Massachusetts at Dartmouth (USA)

P20 • #415
Optimizing the Performance of a Hybrid Method for Numerically Solving and Visualizing Vascular Flows
Boris Brimkov, James Kotary, Xinwei Liu and Jing Zheng, State University of New York at Buffalo (USA)

Tuesday, July 26 – 10:30 - 12:30

Room BA101

SS-HPC II
High Performance Computing: From Models of Computation to Applications II

Session Chairs:
Marc Moreno Maza and Yuzhen Xie, University of Western Ontario (Canada)

10:30 - 11:00 • #383
Grappling with Gargantuan Graphs of Neural Functional Connectivity
Mark Daley, University of Western Ontario (Canada)

11:00 - 11:30 • #394
High-Performance Parallel and Stream Processing of X-ray Microdiffraction Data
Michael Bauer[1], Alain Biem[2], Stewart McIntyre[1], and Yuzhen Xie[1], [1]University of Western Ontario (Canada) [2]IBM Research (USA)

11:30 - 12:00 • #397
Complexity and Performance Results for Non FFT-Based Univariate Polynomial Multiplication
Muhammad Foizul Islam Chowdhury[1], Marc Moreno Maza[1], Wei Pan[2], and Eric Schost[1], [1]University of Western Ontario (Canada) [2]Intel Corp. (Canada)

Room BA102

Room BA112

SS-DAE II
Design and Analysis of Experiments and Statistical Methods II

Session Chair:
Krishnasamy Arasu
Wright State University (USA)

10:30 - 11:00 • #248
Algebraic Generation of Orthogonal Fractional Factorial Designs
Roberto Fontana, Politecnico di Torino - DIMAT (Italy)

11:00 - 11:30 • #307
Optimal and Robust Designs for Full and Reduced Fourier Regression Models
Xiaojian Xu and Xiaoli Shang, Brock University (Canada)

11:30 - 12:00 • #402
Multilevel Hadamard Matrices
Krishnasamy Arasu and Keli Parker, Wright State University (USA)

12:00 - 12:30 • #603
A Design Theory Approach to Fault Isolation
Gary Bazdell, Carleton University (Canada)

Room BA113

SS-MNANO II
Mathematical Models for Nanoscience and Nanotechnology II

Session Chair:
A. Hamed Majedi
University of Waterloo (Canada)

10:30 - 11:00 • #83
Theoretical Modeling of the Donor-Acceptor Pair Photoluminescence Dymanics in Ga_2O_3 Nanocrystals
Manu Hegde, Ting Wang, Zoran Miskovic, and Pavle Radovanovic, University of Waterloo (Canada)

11:00 - 11:30 • #177
Ionic Screening of Charged Impurities in Graphene
Puneet Sharma and Zoran Miskovic, University of Waterloo (Canada)

11:30 - 12:00 • #380
Hybrid Continuum and Molecular Modeling of Nano-flows
Alex Povitsky[1] and Shunliu Zhao[2], [1]University of Akron (USA) [2]Carleton University (Canada)

Room BA201

SS-CMHP III
Computational Methods for Hyperbolic Problems III

Session Chairs:
Jae-Hun Jung, SUNY Buffalo (USA) and Allen Tesdall, CUNY College of Staten Island (USA)

Semi-Plenary Presentation

10:30 - 11:30
Towards a Robust, Multi-Domain, Energy Stable WENO Formulation for High Speed Flows
Mark Carpenter[1], Nail Yamaleev[2], and Travis Fisher[1], [1]NASA Langley Research Center (USA) [2]North Carolina A&T State University (USA)

Abstract: see page 9

11:30 - 12:00 • #114
High Order Positivity Preserving ENO and DG Methods for Hyperbolic Equations
Martin Berzins, University of Utah (USA)

12:00 - 12:30 • #102
Spectral Methods for Nearly Hyperbolic Problems in Lake Hydrodynamics
Marek Stastna, Derek Steinmoller, Jason Olsthoorn, and Anton Baglaenko, Univeristy of Waterloo (Canada)

Tuesday, July 26 – 10:30 - 12:30

Room BA202

SS-SSD I

Progress and Prospects in Model-Based Scientific Software Development I

Session Chair:
Christopher Anand
McMaster University (Canada)

10:30 - 11:00 • #251
Model-based Engineering Design and the Influence of Symbolic Computation, Part I
Tom Lee, Maplesoft (Canada)

11:00 - 11:30 • #252
Model-based Engineering Design and the Influence of Symbolic Computation, Part II
Tom Lee, Maplesoft (Canada)

11:30 - 12:00 • #249
The Structure of Typed Generic Code Generators
Jacques Carette, McMaster University (Canada)

12:00 - 12:30 • #250
A Family Approach For Scientific Computing Software
Wen Yu and Spencer Smith, McMaster University (Canada)

Room BA208

Room BA209

SS-HONM I

High Order Numerical Methods for Partial Differential Equations I

Session Chair:
Jun Jia
Oak Ridge National Laboratories (USA)

10:30 - 11:00 • #238
High Order AMR Based on WENO
Andrew Christlieb, Michigan State University (USA)

11:00 - 11:30 • #88
Robust Reconstructions for Unstructured WENO Schemes
Yuan Liu and Yong-Tao Zhang, University of Notre Dame (USA)

11:30 - 12:00 • #606
Positivity Preserving Well-Balanced Methods for the Shallow-Water Equations
Yulong Xing, University of Tennessee and Oak Ridge National Laboratory (USA)

12:00 - 12:30 • #217
High Order, Stable Numerical Simulations of Rigid-Rod Nematic Polymers
Ruhai Zhou[1], M. Gregory Forest[2], and Qi Wang[3], [1]Old Dominion University (USA) [2]University of North Carolina at Chapel Hill (USA) [3]University of South Carolina (USA)

Room BA210

SS-CDPB I

Complex Dynamics of Population Behaviour with Impact to Socio-Economic Issues I

Session Chair:
Monica Cojocaru
University of Guelph (Canada)

10:30 - 11:00 • #10
Additive Representation of Separable Preferences over Infinite Cartesian Products
Marcus Pivato, Trent University (Canada)

11:00 - 11:30 • #104
An Agent-Based Model of Stock Market Investors with Social Network Effects
Veronica Gheorghiade and Monica Gabriela Cojocaru, University of Guelph (Canada)

11:30 - 12:00 • #107
Significance and Complexity of the Impacts of Land Market on Land Use Change: An Agent-based Experiment
Dawn Parker[1], Shipeng Sun[1], Tatiana Filatova[2], and Qingxu Huang[1], [1]University of Waterloo (Canada) [2]University of Twente (Netherlands)

12:00 - 12:30 • #136
Social Interaction Dynamics and Their Effect on New Product Adoption
Christopher Hogg, Monica Cojocaru, and Scott Greenhalgh, University of Guelph (Canada)

Room BA211

SS-MBP I

Modeling in Biophysics I

Session Chairs:
Bae-Yuen Ha, University of Waterloo (Canada) and Mikko Karttunen, University of Western Ontario (Canada)

10:30 - 11:00 • #60
Emergence of Long Time Scales and Stereotyped Behaviors in C. elegans
William Ryu[1], Greg Stephens[2], and William Bialek[2], [1]University of Toronto (Canada) [2]Princeton University (USA)

11:00 - 11:30 • #281
Relationship Between Model Bacterial Peptidoglycan Network Structures and AFM Force-Distance Curves
Aidan Brown[1], Robert Wickham[1], John Dutcher[1], and Ahmed Touhami[2], [1]University of Guelph (Canada) [2]University of Texas at Brownsville (USA)

11:30 - 12:00 • #139
The Iceberg Model of Hydration and its Breakdown: Interplay of Structure and Dynamics in Hydrophobic Hydration
John Tatini Titantah and Mikko Karttunen, University of Western Ontario (Canada)

12:00 - 12:30 • #359
Ring Polymers in a Confined Space as Model Bacterial Chromosomes
Y. Jung[1], J. Kim[2], C. Jeon[2], H. Jeong[2], S. Jun[3], and B.-Y. Ha[4], [1]KISTI (Korea) [2]KAIST (Korea) [3]Harvard University (USA) [4]University of Waterloo (Canada)

Tuesday, July 26 – 15:15 - 16:45

Room BA101

CS-CPC I
Computational Physics and Chemistry I

Session Chair:
Brian West
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #8
Nonlinear Quantum Optics Model for Laser-Gas Interaction in Some Extreme Regimes
Emmanuel Lorin[1] and André Bandrauk[2], [1]Carleton University (Canada) [2]Université de Sherbrooke (Canada)

15:45 - 16:15 • #355
Adiabatic Control of Single Electron Spins in Semiconductor Quantum Dots through the Application of Berry Phase
Sanjay Prabhakar and Roderick Melnik, Wilfrid Laurier University (Canada)

16:15 - 16:45 • #78
On the Numerical Solution of the Convection Diffusion Equation in the Real Projective Plane
Jukka Tuomela and Mahdieh Sattari, University of Eastern Finland (Finland)

Room BA102

SS-CNT III
Computational Number Theory III

Session Chair:
Kevin Hare
University of Waterloo (Canada)

15:15 - 15:45 • #48
Vanishing Theta Nulls and Genus 3 Algebraic Curves
Lubjana Beshaj[1], Tony Shaska[2], and Valmira Hoxha[1], [1]Research Institute of Science and Technology (Albania) [2]Oakland University (USA)

15:45 - 16:15 • #123
Mahler Measures of Elliptic Curves
Mathew Rogers, University of Illinois (USA)

16:15 - 16:45 • #68
Computing Values of Metric Mahler Measures
Charles Samuels[1] and Jonas Jankauskas[2], [1]Simon Fraser University/University of British Columbia (Canada) [2]Vilnius University (Lithuania)

Room BA112

SS-SCPD
Mathematical Modeling of Supply Chain and Product Development in High-Tech Industries

Session Chair:
Amy H. I. Lee
Chung Hua University (Taiwan)

15:15 - 15:45 • #35
An Integrated Model for Supplier Selection for a High-Tech Manufacturer
Amy Lee[1], He-Yau Kang[2], and Chun-Yu Lin[1], [1]Chung Hua University (Taiwan) [2]Chin-Yi University of Technology, Taichung (Taiwan)

15:45 - 16:15 • #37
New Product Development for Green and Low-Carbon Products - A Case Study of a TFT-LCD Manufacturer
Chun Yu Lin and Amy H. I. Lee, Chung Hua University (Taiwan)

16:15 - 16:45 • #59
Pickup and Delivery Problem with Stochastic Travel Times for Semiconductor Supply Chains
Chun-Mei Lai, Far East University (Taiwan)

Room BA113

Room BA201

CS-BSM II
Mathematics and Computation in Biological Sciences and Medicine II

Session Chair:
Alex Zhukov
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #339
An Immersed-Boundary Lattice-Boltzmann Model for Microscopic Blood Flow Simulations
Junfeng Zhang, Laurentian University (Canada)

15:45 - 16:15 • #347
Identification of Transposon Insertion Polymorphisms (TIPs) by Computational Comparative Analysis of Next Generation Personal Genome Data
Xuemei Luo[1], Frank Dehne[2], and Ping Liang[3], [1]Carleton University/Brock University (Canada) [2]Carleton University (Canada) [3]Brock University (Canada)

16:15 - 16:45 • #352
Modeling the Effect of Topical Oxygen Therapy on Wound Healing
Ephraim Agyingi, David Ross, and Sophia Maggelakis, Rochester Institute of Technology (USA)

Tuesday, July 26 – 15:15 - 16:45

Room BA202

CS-FINANCE I
Financial Mathematics and Computation I

Session Chair:
Y. George Lai
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #56
Improved One-Factor Gaussian Copula Model for Pricing Heterogeneous Colaterallized Debt Obligations
Xin Gao, Tobias Schaefer, and Brian Schwartz, City University of New York (USA)

15:45 - 16:15 • #202
Exploiting Domain Knowledge to Forecast Heating Oil Consumption
George Corliss, Tsuginosuke Sakauchi, and Ronald H. Brown, Marquette University (USA)

16:15 - 16:45 • #98
Analysis of Tax-deductible Interest Payments for Re-Advanceable Canadian Mortgages
Almas Naseem and Mark Reesor, University of Western Ontario (Canada)

Room BA208

SS-CMHP IV
Computational Methods for Hyperbolic Problems IV

Session Chairs:
Jae-Hun Jung, SUNY Buffalo (USA) and Allen Tesdall, CUNY College of Staten Island (USA)

15:15 - 15:45 • #149
Global Solutions for Transonic Two-Dimensional Riemann Problems
Eun Heui Kim, California State University - Long Beach (USA)

15:45 - 16:15 • #314
Self-Similar Solutions for the Diffraction of Weak Shocks
Allen Tesdall[1] and John Hunter[2], [1]CUNY (USA) [2]University of California, Davis (USA)

16:15 - 16:45 • #166
The Modified Buckley-Leverett Equation
Ying Wang[1] and Chiu-Yen Kao[2], [1]University of Minnesota (USA) [2]The Ohio State University (USA)

Room BA209

SS-HONM II
High Order Numerical Methods for Partial Differential Equations II

Session Chair:
Yulong Xing
University of Tennessee and Oak Ridge National Laboratories (USA)

15:15 - 15:45 • #223
Locally-Corrected Spectral Methods for Elliptic Systems
John Strain, University of California, Berkeley (USA)

15:45 - 16:15 • #237
High-Order Positivity-Preserving DG-FEM for Vlasov Models of Plasma
James Rossmanith and David Seal, University of Wisconsin - Madison (USA)

16:15 - 16:45 • #67
Augmented High Order Finite Volume Element Method for Elliptic PDEs in Non-smooth Domains: Convergence Study
Yasunori Aoki and Hans De Sterck, University of Waterloo (Canada)

Room BA210

SS-MCMI II
Mathematical and Computational Modeling of Influenza II

Session Chair:
Catherine Beauchemin
Ryerson University (Canada)

15:15 - 15:45 • #109
Effects of Environmental Conditions on the Dynamics of Avian Influenza among Wild Birds
Naveen Vaidya and Lindi Wahl, University of Western Ontario (Canada)

15:45 - 16:15 • #602
Mathematical Modeling of Influenza Within a Host or Cell Culture
Catherine Beauchemin, Ryerson University (Canada)

16:15 - 16:45 • #100
Analysis of a Spatial Model for Influenza Viral Infections
Murray Alexander[1] and Beni Sahai[2], [1]National Research Council (Canada) [2]Cadham Provincial Laboratory (Canada)

Room BA211

SS-NMMM I
Numerical Methods for Mathematical Models Based on ODEs, PDEs, Integral and Integro-Differential Equations I

Session Chair:
Faranak Pahlevani
Penn State University, Abington College (USA)

15:15 - 15:45 • #276
Nested Uzawa Algorithms in Models for the Cementing of Oil and Gas Wells
Mariana Carrasco-Teja and Ian Frigaard, University of British Columbia (Canada)

15:45 - 16:15 • #266
A Finite Element Approximation of Navier-Stokes Alpha Model
Atife Caglar, Univeristy of Wisconsin-Green Bay (USA)

16:15 - 16:45 • #246
Numerical Study of the Slip with Friction Boundary Conditions for the Regularized Navier-Stokes Equations
Monika Neda and Pengtao Sun, University of Nevada Las Vegas (USA)

Tuesday, July 26 – 17:15 - 18:45

Room BA101

CS-CPC I
Computational Physics and Chemistry I

Session Chair:
Brian West
Wilfrid Laurier University (Canada)

17:15 - 17:45 • #148
Atomic Simulation of Novel Functional Materials for Radiation Medical Imaging Detectors
Oleg Rubel, Thunder Bay Regional Research Institute (Canada)

17:45 - 18:15 • #403
Inhomogeneous Plane Symmetric Cosmological Model in Scale Invariant Theory
Bivudutta Mishra, Birla Institute of Technology & Science - Pilani, Hyderabad Campus (India)

18:15 - 18:45 • #29
Nanoscopic Heat Conduction: Numerical Solutions, Main Features and New Developments
Alaeddin Malek, Tarbiat Modares University (Iran)

Room BA102

SS-CNT III
Computational Number Theory III

Session Chair:
Kevin Hare
University of Waterloo (Canada)

17:15 - 17:45 • #218
Tabulating All Cubic Function Fields via Class Field Theory
Renate Scheidler and Colin Weir, University of Calgary (Canada)

17:45 - 18:15 • #382
Some Problems and Results Concerning Stern's Diatomic Sequence
Michael Coons, Fields Institute and University of Waterloo (Canada)

Room BA112

SS-SCPD
Mathematical Modeling of Supply Chain and Product Development in High-Tech Industries

Session Chair:
Amy H. I. Lee
Chung Hua University (Taiwan)

17:15 - 17:45 • #61
Multi-objective Programming for Lot-sizing with Quantity Discount
He-Yau Kang[1], Amy H. I. Lee[2], Chun-Mei Lai[3], and Mei-Sung Kang[4], [1]National Chin-Yi University of Technology (Taiwan) [2]Chung Hua University (Taiwan) [3]Far East University (Taiwan) [4]Kao Yuan University (Taiwan)

17:45 - 18:15 • #350
Maintenance Scheduling in Restructured Power Systems Using Benders Decomposition
Mohammad Fattahi[1], Masoud Mahootchi[1], and Farhad Fallahi[2], [1]Amirkabir University of Technology (Iran) [2]Niroo Research Institute (Iran)

18:15 - 18:45 • #373
Stochastic Multi-Commodity Facility Location Based on a New Scenario Generation Technique
Masoud Mahootchi, Mohammad Fattahi, and Ehsan Khakbazan, Amirkabir University of Technology (Iran)

Room BA113

Room BA201

CS-BSM II
Mathematics and Computation in Biological Sciences and Medicine II

Session Chair:
Alex Zhukov
Wilfrid Laurier University (Canada)

17:15 - 17:45 • #356
Enumeration of Saturated RNA Secondary Structures
Hsun-Wen Chang and Siang-Ning Zeng, Tatung University (Taiwan)

17:45 - 18:15 • #406
Numerical Experiments on Existence and Non-Uniqueness of Solutions of the Thermistor Problem with Helmholtz Term
Tim Kröger, University of Bremen (Germany)

Tuesday, July 26 – 17:15 - 18:45

Room BA202

Room BA208

SS-CMHP IV
Computational Methods for Hyperbolic Problems IV

Session Chairs:
Jae-Hun Jung, SUNY Buffalo (USA) and Allen Tesdall, CUNY College of Staten Island (USA)

17:15 - 17:45 • #340
A Hybrid Radial Basis Function Method for Numerical Solutions of Vascular Flow
Boris Brimkov, James Kotary, Xinwei Liu, and Jing Zheng, SUNY at Buffalo (USA)

17:45 - 18:15 • #54
Causality Indicators for Discontinuous Galerkin Fast Sweeping Methods
Yong-Tao Zhang, University of Notre Dame (USA)

18:15 - 18:45 • #333
Uncertainty Quantification for the Critical Phenomenon of Nonlinear Optics Equations with a Point-Like Impurity Using the Generalized Polynomial Chaos Method
Jae-Hun Jung and Debananda Chakraborty, State University of New York at Buffalo (USA)

Room BA209

SS-HONM II
High Order Numerical Methods for Partial Differential Equations II

Session Chair:
Yulong Xing
University of Tennessee and Oak Ridge National Laboratories (USA)

17:15 - 17:45 • #288
A Discontinuous Galerkin Solver for Front Propagation with Obstacles
Olivier Bokanowski[1], Yingda Cheng[2], and Chi-Wang Shu[3], [1]Paris 6 and Paris 7 (France) [2]University of Texas at Austin (USA) [3]Brown University (USA)

17:45 - 18:15 • #379
High-Order of Approximation Method for Modeling of Aerodynamics of Flapping Wings
Alex Povitsky[1] and Harish Gopalan[2], [1]University of Akron (USA) [2]University of Wyoming (USA)

18:15 - 18:45 • #421
Krylov Deferred Correction Methods
Jun Jia, Oak Ridge National Laboratories (USA)

Room BA210

SS-MCMI II
Mathematical and Computational Modeling of Influenza II

Session Chair:
Catherine Beauchemin
Ryerson University (Canada)

17:15 - 17:45 • #200
Full Viral Kinetic Parameterization of a Pair of Seasonal H1N1 Influenza Virus Strains in vitro: An Application to Antiviral Resistance
Benjamin Holder[1], Philippe Simon[2], Guy Boivin[3], and Catherine Beauchemin[1], [1]Ryerson University (Canada) [2]National Microbiology Laboratory, Winnipeg (Canada) [3]Universite Laval (Canada)

17:45 - 18:15 • #96
The Effect of Virion External Packaging on the Dynamics of Drug-Resistant Influenza Virus
Hana Dobrovolny and Catherine Beauchemin, Ryerson University (Canada)

18:15 - 18:45 • #605
Panel Discussion
Catherine Beauchemin, Ryerson University (Canada)

Room BA211

SS-NMMM I
Numerical Methods for Mathematical Models Based on ODEs, PDEs, Integral and Integro-Differential Equations I

Session Chair:
Faranak Pahlevani
Penn State University, Abington College (USA)

17:15 - 17:45 • #275
Parameter Sensitivity of Eddy Viscosity Models with Applications
Faranak Pahlevani[1] and Lisa Davis[2], [1]Penn State University, Abington College (USA) [2]Montana State University (USA)

17:45 - 18:15 • #161
Cell-Centred Finite Difference Numerical Method for Solving Partial Differential Equations
James Jianmin Situ and Ronald Barron, University of Windsor (Canada)

Wednesday, July 27 – 10:30 - 12:30

Room BA101

CS-CPC II
Computational Physics and Chemistry II

Session Chair:
Steven Burger
McMaster University (Canada)

10:30 - 11:00 • #178
Vibrationally Averaged Long-Range Molecule-Molecule Dispersion Coefficients from Coupled-Cluster Calculations
Matthew Schmidt and Marcel Nooijen, University of Waterloo (Canada)

11:00 - 11:30 • #189
Theoretical Description of Photoelectron Spectra of Biradicaloids
Prateek Goel and Marcel Nooijen, University of Waterloo (Canada)

11:30 - 12:00 • #336
An Efficient Parallel Numerical Method for Solving Reaction-Diffusion Partial Differential Equations based on Generalized Random Trees
Ángel Rodríguez-Rozas and Juan A. Acebrón, Instituto Superior Técnico (Portugal)

12:00 - 12:30 • #302
Plane Symmetric Domain Walls and Cosmic Strings in Bimetric Theory
Pradyumn Kumar Sahoo, Birla Institute of Technology & Science - Pilani, Hyderabad Campus (India)

Room BA102

SS-VS I
Numerical Methods for First and Second Order Fully Nonlinear PDEs I

Session Chair:
Xiaobing Feng
University of Tennessee (USA)

10:30 - 11:00 • #25
Finite Element Methods for the Monge-Ampere Equation
Michael Neilan[1], Susanne Brenner[1], Thirupathi Gudi[2], and Li-Yeng Sung[1], [1]Louisiana State University (USA) [2]Indian Institute of Science (India)

11:00 - 11:30 • #34
A Local Discontinuous Galerkin Method for Directly Solving Hamilton-Jacobi Equations
Jue Yan, Iowa State University (USA)

11:30 - 12:00 • #69
An Adjoint State Method for Numerical Approximation of Continuous Traffic Congestion Equilibria
Jianliang Qian[1], Songting Luo[1], and Shingyu Leung[2], [1]Michigan State University (USA) [2]HKUST (China)

12:00 - 12:30 • #120
Admissibility Criteria for Compressible Potential Flow
Volker Elling, University of Michigan (USA)

Room BA112

SS-SSD II
Progress and Prospects in Model-Based Scientific Software Development II

Session Chair:
Christopher Anand
McMaster University (Canada)

10:30 - 11:00 • #259
MRI Velocity Imaging: A Case Study in Symbolic Code Generation
Christopher K. Anand, Maryam Moghadas, and Jessica L. M. Pavlin, McMaster University (Canada)

11:00 - 11:30 • #260
MRI Velocity Imaging: A Novel Application of Physical Units to Type Safety
Maryam Moghadas, Christopher K. Anand, and Jessica L. M. Pavlin, McMaster University (Canada)

11:30 - 12:00 • #274
Degradation of Accuracy in Computational Code
N. J. Meng[1], D. Kelly[2], and T. R. Dean[1], [1]Queen's University (Canada) [2]Royal Military College (Canada)

12:00 - 12:30 • #607
Probability Smoothing for Natural Language Processing: A Case Study for Functional Programming and Little Languages
Wren Ng Thornton, Indiana University (USA)

Room BA113

SS-MMPF
Mathematical Modeling of Protein Flexibility

Session Chair:
Forbes Burkowski
University of Waterloo (Canada)

10:30 - 11:00 • #222
Predicting Protein Hinge Motions and Allostery Using Rigidity Theory
Adnan Sljoka[1] and Alexandr Bezginov[2], [1]York University (Canada) [2]University of Toronto (Canada)

11:00 - 11:30 • #230
On the Universal Rigidity of Bar Frameworks in General Position
A Alfakih[1] and Yinyu Ye[2], [1]University of Windsor (Canada) [2]Stanford University (USA)

11:30 - 12:00 • #233
LoopWeaver - Loop Modeling by the Weighted Scaling of a Verified Protein
Daniel Holtby[1], Shuai Cheng Li[2], and Ming Li[1], [1]University of Waterloo (Canada) [2]University of California, Berkeley (USA)

12:00 - 12:30 • #210
Protein Flexibility of Dimers: Do Symmetric Motions Play a Role in Allosteric Interactions?
Bernd Schulze[1], Adnan Sljoka[2], and Walter Whiteley[2], [1]Free University (Germany) [2]York University (Canada)

Room BA201

SS-SMES
Statistical Modeling in Environmental Sciences

Session Chair:
Yulia Gel
University of Waterloo (Canada)

10:30 - 11:00 • #145
Probabilistic Weather Forecasting using the GOP Hierarchical Space-time Models
Lilia L. Ramirez Ramirez and Yulia Gel, University of Waterloo (Canada)

11:00 - 11:30 • #190
Assessment of Trends in Environmental Quality Variables
Sylvia Esterby, UBC Okanagan (Canada)

11:30 - 12:00 • #228
Statistical Tests for Dependent Hydrological Time Series
Kimihiro Noguchi[1], Yulia Gel[2], and Claude Duguay[2], [1]University of California, Davis (USA) [2]University of Waterloo (Canada)

12:00 - 12:30 • #313
Monte-Carlo Portmanteau Adequacy Tests for Multivariate Time Series Models
Ian McLeod and Esam Mahdi, University of Western Ontario (Canada)

Wednesday, July 27 – 10:30 - 12:30

Room BA202

CS-FINANCE II
Financial Mathematics and Computation II

Session Chair:
Roman Makarov
Wilfrid Laurier University (Canada)

10:30 - 11:00 • #151
Calibration of Local Volatility Models by Tikhonov-Type Regularization
Adriano De Cezaro[1] and Jorge P. Zubelli[2], [1]Federal University of Rio Grande (Brazil) [2]IMPA (Brazil)

11:00 - 11:30 • #163
Variance Reduction Methods for Pricing and Hedging Exotic Options Beyond Black-Scholes-Merton's Models
Yongzeng Lai[1] and Yan Zeng[2], [1]Wilfrid Laurier University (Canada) [2]Sun Yat-sen University (China)

11:30 - 12:00 • #263
A Mixed Integer Linear Programming Model for Optimal Sovereign Debt Issuance
Paresh Date, Malek Abdel-Jawad, and Alessandra Canepa, Brunel University (United Kingdom)

12:00 - 12:30 • #321
A Linear Approximation of CVaR Constraints in a Multi-Period Portfolio Selection Using Simulated Return Scenarios
Abbas Seifi and Somayeh Sadeghi, Amirkabir University of Technolgy (Iran)

Room BA208

CS-APMRE
Applied Problems and methods in Research and Education

Session Chair:
Douglas Woolford
Wilfrid Laurier University (Canada)

10:30 - 11:00 • #43
Graphs and Semantics
Fairouz Tchier, King Saud University (Saudi Arabia)

11:00 - 11:30 • #247
Sextic B-spline Collocation Algorithm for the Modified Equal Width Equation
Saleh Mohammed Hassan Ahmed and Dirhem Ghaleb Alamery, King Saud University (Saudi Arabia)

11:30 - 12:00 • #278
Multi-Level Computational Linguistic Model based on Information Fusion Theory
H. Cristyan Manta Caro, Octavio J. Salcedo Parra, and C. Julieth Manta Caro, Universidad Distrital Francisco José de Caldas (Colombia)

12:00 - 12:30 • #71
A Time Splitting Semi-Implicit Scheme for Atmospheric Modeling
Andrei Bourchtein and Ludmila Bourchtein, Pelotas State University (Brazil)

Room BA209

SS-MBP II
Modeling in Biophysics II

Session Chairs:
Bae-Yuen Ha, University of Waterloo (Canada) and Mikko Karttunen, University of Western Ontario (Canada)

10:30 - 11:00 • #341
Hybrid Continuum-MD Approach to Simulating Mesoscopic Systems
Colin Denniston, University of Western Ontario (Canada)

11:00 - 11:30 • #360
Volumetric Properties of the Hydrophobic Interaction: Pressure Dependence
Cristiano Dias and Hue Sun Chan, University of Toronto (Canada)

11:30 - 12:00 • #346
Adsorption of Inhibitor Peptides on Hydroxyapatite and Calcium Oxalate Monohydrate Surfaces: A Computational Study
Jari Jalkanen, Jason O'Young, Susanna Hug, Mikko Karttunen, Harvey Goldberg, and Graeme Hunter, University of Western Ontario (Canada)

12:00 - 12:30 • #338
A Mathematical Model for Spherical Ionic Micelles in the Presence of Excess Salt
Mona Habibi[1], Maria Sammalkorpi[2], Mikko Haataja[3], and Mikko Karttunen[1], [1]University of Western Ontario (Canada) [2]Yale University (USA) [3]Princeton University (USA)

Room BA210

SS-CDPB II
Complex Dynamics of Population Behaviour with Impact to Socio-Economic Issues II

Session Chair:
Christopher Hogg
University of Guelph (Canada)

10:30 - 11:00 • #132
The Network of Sponsored Search Auctions
Babak Farzad, Brock University (Canada)

11:00 - 11:30 • #137
Shopkeeper Strategies for Iterated Prisoner's Dilemma
Dan Ashlock, Chris Kuusela, and Monica Cojocaru, University of Guelph (Canada)

11:30 - 12:00 • #158
A Linear Programming Network Analysis of Phosphorus Reduction Strategies for the Lake Simcoe Watershed
James Maclellan, Martin Bunch, and Kaz Higuchi, York University (Canada)

12:00 - 12:30 • #378
New Product Adoption with Dynamic Consumer Preferences and Endogenous Pricing
Monica Cojocaru, Dominic Nelson, Henry Thille, and Ed Thommes, University of Guelph (Canada)

Room BA211

SS-NMMM II
Numerical Methods for Mathematical Models Based on ODEs, PDEs, Integral and Integro-Differential Equations II

Session Chair:
Atife Caglar
University of Wisconsin - Green Bay (USA)

10:30 - 11:00 • #105
Analysis of Long Time Stability and Errors of Two Stable Partitioned Methods for Uncoupling Evolutionary Groundwater-Surfacewater Flows
William Layton, Hoang Tran, and Catalin Trenchea, University of Pittsburgh (USA)

11:00 - 11:30 • #268
Perturbation Methods for Vibrations of Moderately Elliptical Plates
Huseyin Yuce, New York City College of Technology - CUNY (USA)

11:30 - 12:00 • #277
Superconvergent Collocation Interpolants for Delay Volterra Integro-Differential Equations
Mohammad Shakourifar and Wayne Enright, University of Toronto (Canada)

Thursday, July 28 – 10:15 - 12:15

Room BA101

SS-CC I
Computational Chemistry I

Session Chair:
Ian Hamilton
Wilfrid Laurier University (Canada)

10:15 - 10:45 • #7
Numerical Solution of the Dirac Equation and Applications in Laser-Matter Interaction
François Fillion-Gourdeau[1], Emmanuel Lorin[2], and Andre D. Bandrauk[3], [1]CRM (Canada) [2]Carleton University (Canada) [3]Université de Sherbrooke (Canada)

10:45 - 11:15 • #9
Density Functional Theory Calculations on Hydrated DMA-Iron Oxide Clusters
Hind Al-Abadleh, Ian Hamilton, and Adrian Adamescu, Wilfrid Laurier University (Canada)

11:15 - 11:45 • #13
Fitting the Electrostatic Potential for Quantum Mechanical/Molecular Mechanical Methods
Steven Burger, Rogelio Cuevas-Saavedra, and Paul Ayers, McMaster University (Canada)

11:45 - 12:15 • #79
Aptamer to Ribozyme: Theoretical and Experimental Strategies for the Study of RNA based Catalysis
Thorsten Dieckmann, University of Waterloo (Canada)

Room BA102

CS-MODELING I
Partial Differential and Integral Equations in Mathematical Modeling I

Session Chair:
Yulia Gel
University of Waterloo (Canada)

10:15 - 10:45 • #6
The Use of the Fourier Transform for Solving Linear Elasticity Problems
Lukas Mocek and Tomas Kozubek, VSB - Technical University of Ostrava (Czech Republic)

10:45 - 11:15 • #372
Inverse Scattering Problems for the Hartree Equation Whose Interaction Potential Decays Rapidly
Hironobu Sasaki, Chiba University (Japan)

11:15 - 11:45 • #93
Domain Decomposition Strategies with Black Box Subdomain Solvers
Silvia Bertoluzza, IMATI-CNR (Italy)

11:45 - 12:15 • #393
Wavelet Analysis of Solitons and its Energy Aspect
Bharat Bhosale, S H Kelkar College, University of Mumbai (India)

Room BA112

SS-CNP
Computational Nanophotonics

Session Chair:
Brian West
Wilfrid Laurier University (Canada)

10:15 - 10:45 • #301
Nano-Scale Photonic Crystal LED Modeling by a Highly Efficient Hardware Accelerated FDTD Method
Lin Han[1], Kang Li[2], Fanmin Kong[2], and Wei-Ping Huang[1], [1]McMaster University (Canada) [2]Shandong University (China)

10:45 - 11:15 • #337
Asymmetric Transition States in Quantum Dots
Brian Spencer[1] and Jerry Tersoff[2], [1]SUNY at Buffalo (USA) [2]IBM (USA)

11:15 - 11:45 • #343
Unconditionally Stable Numerical Method to Quantum Dot Formation
Daniel Rider, Josh Lauzier, Calvin Holic, John Susice, and Brian Spencer, SUNY at Buffalo (USA)

11:45 - 12:15 • #395
Advanced Simulations of Photonic Nanostructures
Jacek M. Miloszewski[1] and Marek S. Wartak[2], [1]University of Waterloo (Canada) [2]Wilfrid Laurier University (Canada)

Room BA113

Room BA201

SS-MB I
Recent Advances in Mathematical Biology I

Session Chair:
Sue Ann Campbell
University of Waterloo (Canada)

10:15 - 10:45 • #38
A Coupled Plankton System with Instantaneous and Delayed Predation
Yuan Yuan, Memorial University of Newfoundland (Canada)

10:45 - 11:15 • #245
Bifurcation of Canard Cycles in Predator-Prey Competition Models
Huaiping Zhu[1] and Chengzhi Li[2], [1]York University (Canada) [2]Peking University (China)

11:15 - 11:45 • #113
The Dynamics of a Laissez-Faire Model with Two Predators
Gunog Seo, McMaster University (Canada)

11:45 - 12:15 • #257
Mathematical Modeling of Cancer Cell Metabolism
Hamid Molavian[1], Mohammad Kohandel[1], Mike Milosevic[2], and Siv Sivaloganathan[1], [1]University of Waterloo (Canada) [2]University of Toronto (Canada)

Thursday, July 28 – 10:15 - 12:15

Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
SS-VS II Numerical Methods for First and Second Order Fully Nonlinear PDEs II **Session Chair**: Chiu-Yen Kao *The Ohio State University (USA)*	**SS-MMSS I** Mathematical Models in Social Sciences I **Session Chair**: Marc Kilgour *Wilfrid Laurier University (Canada)*	**SS-EG** Evolutionary Games in Biology and Ecology **Session Chairs**: *Joe Apaloo, St. Francis Xavier University (Canada) and Ross Cressman, Wilfrid Laurier University (Canada)*		
10:15 - 10:45 • #169 **Analysis and Numerical Approximation of Viscosity Solutions with Shocks** *Susana Serna, Universitat Autonoma Barcelona (Spain)*	10:15 - 10:45 • #11 **Quasiutilitarian Social Choice with Approximate Interpersonal Comparison of Welfare Gains** *Marcus Pivato, Trent University (Canada)*	10:15 - 10:45 • #143 **Stability in Models of Behavioral and Population Coevolution: Time Scales in Predator-Prey Systems** *Ross Cressman, Wilfrid Laurier University (Canada)*		
10:45 - 11:15 • #229 **A Multiscale Method for Coupling Network Models and Continuum Equations in Porous Media** *Chia-Chieh Jay Chu, Bjorn Engquist, Yen-Hsi Richard Tsai, and Maša Prodanović, University of Texas at Austin (USA)*	10:45 - 11:15 • #32 **Narrowing the Field in Elections: The Next-Two Rule** *Steven Brams[1] and Marc Kilgour[2], [1]New York University (USA) [2]Wilfrid Laurier University (Canada)*	10:45 - 11:15 • #155 **Neighborhood Invader Strategies in Co-evolutionary Models** *Joe Apaloo, St. Francis Xavier University (Canada)*		
11:15 - 11:45 • #196 **Recovery of High Frequency Wave Fields from Phase Space Based Measurements** *Hailiang Liu[1] and James Ralston[2], [1]Iowa State University (USA) [2]UCLA (USA)*	11:15 - 11:45 • #135 **A Procedure for Fair Division of Indivisible, Identical Objects with Entitlements** *Andrew Kabbes, Marc Kilgour, and Ross Cressman, Wilfrid Laurier University (Canada)*	11:15 - 11:45 • #300 **Strategic Effects of Mobility in Predator-Prey Systems** *Fei Xu and Ross Cressman, Wilfrid Laurier University (Canada)*		
	11:45 - 12:15 • #30 **A Simple Bargaining Mechanism That Elicits Truthful Reservation Prices** *Marc Kilgour[1], Steven Brams[2], and Todd Kaplan[3], [1]Wilfrid Laurier University (Canada) [2]New York University (USA) [3]University of Haifa (Israel)*	11:45 - 12:15 • #377 **Species Coexistence in Non-ESS Communities: It's All About NIS (Neighborhood Invasion Stability)** *Joel Brown[1] and Joe Apaloo[2], [1]University of Illinois at Chicago (USA) [2]St. Francis Xavier University (Canada)*		

Thursday, July 28 – 15:00 - 16:30

Room BA101

SS-BNANO
Computational Bionanotechnology

Session Chairs:
Hin-Hark Gan, New York University (USA) and Gaurav Arya, UC San Diego (USA)

15:00 - 15:30 • #15
Recovering Single-Molecule Energetics and Kinetics from Force Spectroscopy
Gaurav Arya, University of California, San Diego (USA)

15:30 - 16:00 • #17
Multiscale Modeling of Biomolecular Machines: Insights into their Structure, Dynamics and Function
Karunesh Arora, University of Michigan (USA)

16:00 - 16:30 • #85
Combinatorial RNA Design
Hin-Hark Gan, New York University (USA)

Room BA102

SS-MMNS
Mathematical Modeling in Neuro-Science

Session Chairs:
Shoja Chenouri and Paul Marriott, University of Waterloo (Canada)

15:00 - 15:30 • #328
Prediction and Connectivity in fMRI Studies of Stroke Recovery
Tanya Schmah, University of Toronto (Canada)

15:30 - 16:00 • #165
Applying Optimal Hierarchical Controllers to Neural Models of Motor Control
Travis Dewolf and Chris Eliasmith, University of Waterloo (Canada)

16:00 - 16:30 • #180
Computational Graph Theoretical Model of the Zebrafish Sensorimotor Pathway
Michael Stobb, Joshua Peterson, Bori Mazzag, and Ethan Gahtan, Humboldt State University (USA)

Room BA112

SS-SND I
Symmetry in Nonlinear Dynamics: Applications and Numerics I

Session Chair:
Cristina Stoica
Wilfrid Laurier University (Canada)

15:00 - 15:30 • #285
A Poisson Structure and Integrator for the Reduced N-body Problem
Holger Dullin, University of Sydney (Australia)

15:30 - 16:00 • #234
The Curved N–body Problem
Ernesto Pérez-Chavela, UAM Izt (Mexico)

16:00 - 16:30 • #256
Symmetries and Dynamics in the $2N$-body Problem with Equal Masses: Case Study of the Hip Hop Family
Daniel Offin, Queen's University (Canada)

Room BA113

SS-SGT
Structured Graph Theory and Applications

Session Chairs:
Chinh Hoang and Kathie Cameron, Wilfrid Laurier University (Canada)

15:00 - 15:30 • #74
Fire Containment in Planar Graphs
Louis Esperet[1], Jan Van Den Heuvel[2], Frédéric Maffray[1], and Félix Sipma[1], [1]CNRS (France) [2]London School of Economics (United Kingdom)

15:30 - 16:00 • #184
Robust Algorithms for Finding Triangles in Special Classes of Graphs
Elaine Eschen[1] and Jeremy Spinrad[2], [1]West Virginia University (USA) [2]Vanderbilt University (USA)

16:00 - 16:30 • #330
Steiner Tree for Fast Data Distribution
Hongbing Fan, Wilfrid Laurier University (Canada)

Room BA201

CS-DSDE I
Applications of Dynamical Systems and Differential Equations I

Session Chair:
Ilias Kotsireas
Wilfrid Laurier University (Canada)

15:00 - 15:30 • #72
Analysis of Neural Networks with Piecewise Constant Argument of Generalized Type
Enes Yılmaz and Marat Akhmet, Middle East Technical University (Turkey)

15:30 - 16:00 • #240
A Tale of Two Maps
Reason L. Machete, University of Reading (United Kingdom)

16:00 - 16:30 • #125
Sparsity Preserved Computation for Matrix Sign Function
E. Fatih Yetkin[1] and Hasan Dağ[2], [1]Istanbul Technical University (Turkey) [2]Kadir Has University (Turkey)

Thursday, July 28 – 15:00 - 16:30

Room BA202

CS-MECHE I
Computational Mechanics and Engineering I

Session Chair:
Sanjay Prabhakar
Wilfrid Laurier University (Canada)

15:00 - 15:30 • #16
Parallel FEM Simulation of Electromechanics of the Heart
Kwai Wong, Xiaopeng Zhao, and Henian Xia, University of Tennessee, Knoxville (USA)

15:30 - 16:00 • #290
Efficient Methods for Analysis of Flows in Grooved Annuli
Hadi Vafadar Moradi and Jerzy M.Floryan, University of Western Ontario (Canada)

16:00 - 16:30 • #44
Effect of Flow Oscillation on Dispersion of a Solute in a Tube
Nagarani Ponakala and Binil Sebastian, The University of the West Indies, Mona Campus (Jamaica)

Room BA208

SS-MMSS II
Mathematical Models in Social Sciences II

Session Chair:
Marc Kilgour
Wilfrid Laurier University (Canada)

15:00 - 15:30 • #153
Game Theory and Social Psychology: Pluralistic Ignorance
Danielle Alessio and D. Marc Kilgour, Wilfrid Laurier University (Canada)

15:30 - 16:00 • #334
Generalizations and Asymptotical Results for Stochastic Rumour Models
Elcio Lebensztayn[1], Fabio Machado[1], and Pablo Rodríguez[2], [1]University of São Paulo (Brazil) [2]University of Campinas (Brazil)

16:00 - 16:30 • #390
Serving Strategy in Tennis: Accuracy vs. Power
Yigal Gerchak[1] and Marc Kilgour[2], [1]Tel Aviv University (Israel) [2]Wilfrid Laurier University (Canada)

Room BA209

SS-AAIP I
Applied Analysis and Inverse Problems I

Session Chairs:
Marcus Garvie and Herb Kunze, University of Guelph (Canada)

15:00 - 15:30 • #23
On Level-Set Regularization Methods for Denoising of Binary Images
Adriano De Cezaro[1] and Antonio Leitão[2], [1]IMPA (Brazil) [2]Federal University of Santa Catarina (Brazil)

15:30 - 16:00 • #28
Edge Detection as an Application of Fractal Imaging
Matthew Demers, University of Guelph (Canada)

16:00 - 16:30 • #207
A Natural Normalized Metric for Images and a Class of Associated Contractive Fractal Transforms
Edward Vrscay[1], Dominique Brunet[1], Davide La Torre[2], and Zhou Wang[1], [1]University of Waterloo (Canada) [2]University of Milan (Italy)

Room BA210

SS-PMHP
Physics and Mathematics of the Human Placenta

Session Chair:
Dmitri Vvedensky
Imperial College, London (UK)

15:00 - 15:30 • #411
The Placenta: The Mathematics of Life Before Birth
Carolyn Salafia, Placental Analytics LLC (USA)

15:30 - 16:00 • #413
Translating Innovative Mathematical and Physical Measures of the Placenta into Predictors of Childhood Health: The Journey from Mathematics and Physics to Pathology to Epidemiology
Dawn Misra[1], Michael Yampolsky[2], Alex Shlakhter[2], Pascal Getreuer[3], and Carolyn Salafia[3], [1]Wayne State University (USA) [2]University of Toronto (Canada) [3]Placental Analytics LLC (USA)

16:00 - 16:30 • #412
Why is there Variety in Placental Shape: Early Influences vs Trophotropism?
Michael Yampolsky[1], Carolyn Salafia[2], and Alex Shlakhter[1], [1]University of Toronto (Canada) [2]Placental Analytics LLC (USA)

Room BA211

SS-TAF I
Theory and Applications in Finance I

Session Chair:
Roman Makarov
Wilfrid Laurier University (Canada)

15:00 - 15:30 • #258
Analysis of Contingent Capital Bonds in Merton-Type Structural Models
Adam Metzler and Mark Reesor, University of Western Ontario (Canada)

15:30 - 16:00 • #270
A Wiener-Hopf Monte-Carlo Simulation Technique for Levy Processes
Alexey Kuznetsov, York University (Canada)

16:00 - 16:30 • #272
Introducing New Tradeable Instruments for Pricing and Hedging in Incomplete Emissions Markets
Matt Davison and Walid Mnif, University of Western Ontario (Canada)

Thursday, July 28 – 16:45 - 18:15

Room BA101

SS-BNANO
Computational Bionanotechnology

Session Chairs:
Hin-Hark Gan, New York University (USA) and Gaurav Arya, UC San Diego (USA)

16:45 - 17:15 • #242
Nanoparticles Composed of RNA-Bolaamphiphile Complexes Suggest Potential as a Therapeutic siRNA Delivery Vehicle as Indicated by Molecular Dynamics Simulations
Taejin Kim, Eliahu Heldman, Robert Blumenthal, and Bruce Shapiro, Center for Cancer Research Nanobiology Program / National Cancer Institute (USA)

17:15 - 17:45 • #353
Coarse-Grained Modeling of the RNA Nanostructure
Maxim Paliy[1], Alexander V. Zhukov[1], Roderick Melnik[1], and Bruce A. Shapiro[2], [1]M[2]NeT Laboratory (Canada) [2]National Cancer Institute (USA)

Room BA102

SS-MMNS
Mathematical Modeling in Neuro-Science

Session Chairs:
Shoja Chenouri and Paul Marriott, University of Waterloo (Canada)

16:45 - 17:15 • #244
EEG Source Modeling with Variational Bayes
William Marshall, University of Waterloo (Canada)

17:15 - 17:45 • #86
Multiscale, Multivariate Spike Train Analysis
Reza Ramezan, Shoja Chenouri, and Paul Marriott, University of Waterloo (Canada)

Room BA112

SS-SND I
Symmetry in Nonlinear Dynamics: Applications and Numerics I

Session Chair:
Cristina Stoica
Wilfrid Laurier University (Canada)

16:45 - 17:15 • #310
A Geometric Analysis of the N-body Problem
Antonio Hernández-Garduño[1] and Cristina Stoica[2], [1]UAM-I (Mexico) [2]Wilfrid Laurier University (Canada)

17:15 - 17:45 • #381
The Spatial Three Body Problem: Analysis of the System from a Singular Reduction Perspective
Jesús Palacián, Flora Sayas, and Patricia Yanguas, Universidad Pública de Navarra (Spain)

17:45 - 18:15 • #366
Euler-Poincare Reduction for Systems with Configuration Space Isotropy
Tanya Schmah, University of Toronto (Canada)

Room BA113

SS-SGT
Structured Graph Theory and Applications

Session Chairs:
Chinh Hoang and Kathie Cameron, Wilfrid Laurier University (Canada)

16:45 - 17:15 • #365
The Induced Matching Polytope
Kathie Cameron, Wilfrid Laurier University (Canada)

17:15 - 17:45 • #376
Blocking Pairs in Signed Graphs
Bertrand Guenin[1], Irene Pivotto[1], and Paul Wollan[2], [1]University of Waterloo (Canada) [2]University of Rome, La Sapienza (Italy)

17:45 - 18:15 • #409
The Complexity of Coloring Some Restricted Classes of Graphs
Chinh Hoang, Wilfrid Laurier University (Canada)

Room BA201

CS-DSDE I
Applications of Dynamical Systems and Differential Equations I

Session Chair:
Ilias Kotsireas
Wilfrid Laurier University (Canada)

16:45 - 17:15 • #95
On Hurwitz and Schur Connecting-Curves and Dense Trajectories
Jorge-Antonio Lopez-Renteria[1], Baltazar Aguirre-Hernandez[1], and Fernando Verduzco[2], [1]Universidad Autonoma Metropolitana (Mexico) [2]Universidad de Sonora (Mexico)

17:15 - 17:45 • #208
The Dynamics of a Delayed Predator-Prey Model with State Dependent Feedback Control
Anuraj Singh and Sunita Gakkhar, Indian Institute of Technology Roorkee (India)

17:45 - 18:15 • #261
Synchronized Oscillation and Oscillation-Arrested for Segmentation Clock Gene of Zebrafish
Kang Ling Liao and Chih-Wen Shih, National Chiao Tung University (Taiwan)

Thursday, July 28 – 16:45 - 18:15

Room BA202

CS-MECHE I
Computational Mechanics and Engineering I

Session Chair:
Sanjay Prabhakar
Wilfrid Laurier University (Canada)

16:45 - 17:15 • #205
Effect of Biofilm Deformation on Mass Transfer and Detachment Forces
Rangarajan Sudarsan and Hermann Eberl, University of Guelph (Canada)

17:15 - 17:45 • #84
Model and Analysis of a System of a Beam Coupled with a Rod
Renuka Menike[1], Meir Shillor[2], and John Purcell[2], [1]No affiliation (Canada) [2]Oakland University (USA)

17:45 - 18:15 • #53
Model and Simulations of the Gao Beam with a Crack
John Purcell, Oakland University (USA)

Room BA208

Room BA209

SS-AAIP I
Applied Analysis and Inverse Problems I

Session Chairs:
Marcus Garvie and Herb Kunze, University of Guelph (Canada)

16:45 - 17:15 • #66
An Algorithm for Solving Underdetermined Inverse Problem : Application to Pharmacokinetics Model
Yasunori Aoki[1], Ken Hayami[2], and Akihiko Konagaya[3], [1]University of Waterloo (Canada) [2]National Institute of Informatics (Japan) [3]Tokyo Institute of Technology (Japan)

17:15 - 17:45 • #99
Stability of Two IMEX Methods, CNLF and BDF2-AB2, for Uncoupling Systems of Evolution Equations
William Layton and Catalin Trenchea, University of Pittsburgh (USA)

17:45 - 18:15 • #282
A Two Steps Method in Inverse Scattering Problem for a Sound-Hard Crack
Kuo-Ming Lee, NCKU (Taiwan)

Room BA210

SS-PMHP
Physics and Mathematics of the Human Placenta

Session Chair:
Dmitri Vvedensky
Imperial College, London (UK)

16:45 - 17:15 • #414
Combining Multiple Cues for Automated Histopathology Image Analysis
Pascal Getreuer[1], Theresa Girardi[2], Yingying Li[3], Carolyn Salafia[2], and Jason Yunger[2], [1]École Normale Supérieur de Cachan (France) [2]Placental Analytics LLC (USA) [3]University of Houston (USA)

17:15 - 17:45 • #289
Perceptual Normalized Information Distance for Image Distortion Analysis Based on Kolmogorov Complexity
Nima Nikvand and Zhou Wang, University of Waterloo (Canada)

17:45 - 18:15 • #417
Statistical Topology of the Human Placenta
Rak-Kyeong Seong[1], Carolyn Salafia[2], and Dmitri Vvedensky[1], [1]Imperial College London (UK) [2]NYU / St. Luke's Roosevelt Hospital (USA)

Room BA211

SS-TAF I
Theory and Applications in Finance I

Session Chair:
Roman Makarov
Wilfrid Laurier University (Canada)

16:45 - 17:15 • #297
Mean-Variance Hedging for Path-Dependent Options
Adam Kolkiewicz, University of Waterloo (Canada)

17:15 - 17:45 • #312
The Generalized Shiryaev's Problem and Skorohod Embedding
Alexander Kreinin[1], Sebastian Jaimungal[2], and Angel Valov[2], [1]Algorithmics (Canada) [2]University of Toronto (Canada)

Friday, July 29 – 10:30 - 12:30

Room BA101

SS-CC II
Computational Chemistry II

Session Chair:
Ian Hamilton
Wilfrid Laurier University (Canada)

10:30 - 11:00 • #131
A Computational Approach to Linear Conjugacy of Chemical Reaction Networks
Matthew Johnston and David Siegel, University of Waterloo (Canada)

11:00 - 11:30 • #157
Two-Electron Confined Quantum Systems: A Configuration Interaction Approach with Single-Particle Products and Explicitly Correlated Wave Functions
Ilya Ryabinkin and Viktor Staroverov, University of Western Ontario (Canada)

11:30 - 12:00 • #164
Computational Studies of Tp2M Complexes and Their Titanium Derivatives (M = 3d transition metal, Tp- = hydrotris(pyrazol-1-yl)borate)
Sonny Lee[1], Lay Ling Tan[1], and Ajay Kayal[2], [1]University of Waterloo (Canada) [2]Budd Larner P.C. (USA)

12:00 - 12:30 • #195
Mixed Clusters of H_2 and H_2O: Insights from Theory and Simulations
Tao Zeng[1], Hui Li[2], Robert J. Le Roy[1], and Pierre-Nicholas Roy[1], [1]University of Waterloo (Canada) [2]Jilin University (China)

Room BA102

CS-MODELING II
Partial Differential and Integral Equations in Mathematical Modeling II

Session Chair:
Kimberly Levere
University of Guelph (Canada)

10:30 - 11:00 • #81
Dynamic Models for the Gao Beam
Meir Shillor, Oakland University (USA)

11:00 - 11:30 • #64
Dynamic Model for the Gao Beam - Regularity and Contact
Mbagne Mbengue, Penn State Greater Allegheny (USA)

11:30 - 12:00 • #348
The Motion of a Gao Beam Between Two Stops
Jeongho Ahn, Arkansas State University (USA)

12:00 - 12:30 • #76
Shock Wave – Turbulence Interaction: Details of a Classifying Construction
Liviu Florin Dinu[1] and Marina Ileana Dinu[2], [1]Institute of Mathematics of the Romanian Academy (Romania) [2]Polytechnical University of Bucharest (Romania)

Room BA112

SS-SND II
Symmetry in Nonlinear Dynamics: Applications and Numerics II

Session Chair:
Pietro-Luciano Buono
UOIT (Canada)

10:30 - 11:00 • #225
Double Hopf Bifurcations with Huygens Symmetry
William Langford, Allan Willms, and Petko Kitanov, University of Guelph (Canada)

11:00 - 11:30 • #232
Symmetry-based Design and Fabrication of Novel Sensor Systems
Antonio Palacios[1], Visarath In[2], and Patrick Longhini[2], [1]San Diego State University (USA) [2]Space and Naval Warfare Center (USA)

11:30 - 12:00 • #269
Stability of Stationary Fronts in Inhomogeneous Wave Equations
Gianne Derks[1], Arjen Doelman[2], Christopher Knight[1], and Hadi Susanto[3], [1]University of Surrey (United Kingdom) [2]Leiden University (Netherlands) [3]University of Nottingham (United Kingdom)

Room BA113

Room BA201

SS-MB II
Recent Advances in Mathematical Biology II

Session Chair:
Jacques Bélair
Université de Montréal (Canada)

10:30 - 11:00 • #27
A Differential Equations View on Honeybees, Varro Destructor and the Deadly Viruses That They Carry
Hermann Eberl and Vardayani Ratti, University of Guelph (Canada)

11:00 - 11:30 • #92
Early Vaccination Against HSV-2
Jane Heffernan[1], Redouane Qesmi[1], Yijun Lou[1], Qian Wang[1], Jianhong Wu[1], and Marc Steben[2], [1]York University (Canada) [2]Institut national de santé publique du Québec (Canada)

11:30 - 12:00 • #214
How Generation-Based Insights Can Inform Antibiotic Stewardship
Amy Hurford[1], David Fisman[2], and Jianhong Wu[3], [1]The Fields Institute, York University, University of Toronto (Canada) [2]University of Toronto (Canada) [3]York University (Canada)

12:00 - 12:30 • #241
Analyzing Heterogenous Transmission Dynamics of Infectious Diseases: An Integrated Approach to the Lyapunov Functions
Hongbin Guo, Public Health Agency of Canada (Canada)

Friday, July 29 – 10:30 - 12:30

Room BA202

SS-CBSG
Connections Between Statistics and Genetics

Session Chair:
Douglas Woolford
Wilfrid Laurier University (Canada)

10:30 - 11:00 • #77
Simultaneous Genetic Association Test on Multiple Traits
Zeny Feng and Michael McDonald, University of Guelph (Canada)

11:00 - 11:30 • #194
A Marginal Mixture Model for Selecting Differentially Expressed Genes Across Two Types of Tissue Samples
Wenqing He, University of Western Ontario (Canada)

11:30 - 12:00 • #106
From Parallel Evolution to Variable-Selection Ensembles
Mu Zhu, University of Waterloo (Canada)

12:00 - 12:30 • #231
Panel Discussion
Douglas Woolford, Wilfrid Laurier University (Canada)

Room BA208

CS-CACO I
Computational Algebra, Combinatorics, and Optimization I

Session Chair:
Hongbing Fan
Wilfrid Laurier University (Canada)

10:30 - 11:00 • #329
Computing Bounded Multi-Choose Combinatorics
Sung-Hyuk Cha, Pace University (USA)

11:00 - 11:30 • #49
On Algebraic Graphs of Large Girth and their Applications
Dorina Hoxha[1], Tony Shaska[2], and Vasyl Ustimenko[3], [1]Research Institute of Science and Technology (Albania) [2]Oakland University (USA) [3]The University of Maria Curie (Poland)

11:30 - 12:00 • #26
Over-Correction for Multi-Level Aggregation for Markov Chains
Killian Miller[1], Hans De Sterck[1], Eran Treister[2], and Irad Yavneh[1], [1]University of Waterloo (Canada) [2]Technion-Israel Institute of Technology (Israel)

17:15 - 17:45 • #332
An Asymptotically Optimal Two-Stage Algorithm of Classifying Multiple Mutually-Obscuring Positives
Hong-Bin Chen, Academia Sinica (Taiwan)

Room BA209

SS-HAM
Homogenization and Applications in the Modeling of Nanoplasmonic Sensors

Session Chair:
Chitra Rangan
University of Windsor (Canada)

10:30 - 11:00 • #150
Dispersion Engineering Nano-Scale, Light-Steering Devices
Kenneth Chau, University of British Columbia (Canada)

11:00 - 11:30 • #213
Analysis of Coherent Interactions in 2-D Gold Nanoparticle Arrays Based Nanoplasmonic Sensors
Jayshri Sabarinathan, University of Western Ontario (Canada)

11:30 - 12:00 • #254
Effective Media Parameters for Dielectric Based Metamaterials
Mo Mojahedi, University of Toronto (Canada)

12:00 - 12:30 • #271
Metallic Nanoparticles on Waveguide Structures: Effects on Waveguide Mode Properties, and the Promise of Sensing Applications
Taiwang Cheng[1], Chitra Rangan[1], and John Sipe[2], [1]University of Windsor (Canada) [2]University of Toronto (Canada)

Room BA210

SS-LSCA
Large Scale Computer Algebra Applications

Session Chair:
Thomas Wolf
Brock University (Canada)

10:30 - 11:00 • #5
A Unified Sampling Scheme for Fast Approximation of the Multiplication of Several Matrices
Wenting Liu, Guangxia Li, and Kuiyu Chang, NTU (Singapore)

11:00 - 11:30 • #140
Modeling and Simulation of Dynamical Systems
Jürgen Gerhard, Maplesoft (Canada)

11:30 - 12:00 • #159
Cache Complexity and Multicore Implementation for Univariate Real Root Isolation
Changbo Chen, Marc Moreno Maza, and Yuzhen Xie, University of Western Ontario (Canada)

12:00 - 12:30 • #235
A Solver for Large Sparse Linear Algebraic Systems
Thomas Wolf[1] and Eberhard Schruefer[2], [1]Brock University (Canada) [2]Frauenhofer Gesellschaft (Germany)

Room BA211

Friday, July 29 – 15:15 - 16:45

Room BA101

SS-MB III
Recent Advances in Mathematical Biology III

Session Chair:
Yuming Chen
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #122
Epidemiological Effects of School Cohort Entry
Daihai He and David J.D. Earn, McMaster University (Canada)

15:45 - 16:15 • #144
Modelling Behaviour-Incidence Dynamics: The Impact of Social Contact Structure and Social Learning
Chris Bauch[1] and Samit Bhattacharyya[2], [1]University of Guelph (Canada) [2]University of Utah (USA)

16:15 - 16:45 • #156
Robust Control Underlying the Bacterial Growth Laws
M Scott[1] and T Hwa[2], [1]University of Waterloo (Canada) [2]University of California, San Diego (USA)

Room BA102

CS-MODELING III
Partial Differential and Integral Equations in Mathematical Modeling III

Session Chair:
Sanjay Prabhakar
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #108
Wave-Wave Interactions of a Gasdynamic Type
Liviu Florin Dinu[1] and Marina Ileana Dinu[2], [1]Institute of Mathematics of the Romanian Academy (Romania) [2]Polytechnical University of Bucharest (Romania)

15:45 - 16:15 • #296
On Conformal Mappings of Spherical Domains
Andrei Bourchtein and Ludmila Bourchtein, Pelotas State University (Brazil)

16:15 - 16:45 • #179
On a Class of Non-Linear Elliptic Over-Determined Problems in a Doubly Connected Domain
Lakhdar Ragoub, Al Yamamah University (Saudi Arabia)

Room BA112

SS-SND III
Symmetry in Nonlinear Dynamics: Applications and Numerics III

Session Chair:
Manuele Santoprete
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #375
Delay-induced Primary Rhythmic Behavior in a Two-Layer Neural Network
Shangjiang Guo[1] and Yuan Yuan[2], [1]Hunan University (China) [2]Memorial University of Newfoundland (Canada)

15:45 - 16:15 • #389
Bifurcation of Symmetric Periodic Orbits in DDEs and Application
Pietro-Luciano Buono[1] and Juancho Collera[2], [1]University of Ontario Institute of Technology (Canada) [2]Queen's University (Canada)

16:15 - 16:45 • #601
Symmetry Operators and Separation of Variables for Dirac's Equation on Curved Space
Ray McLenaghan, University of Waterloo (Canada)

Room BA113

Room BA201

CS-DSDE II
Applications of Dynamical Systems and Differential Equations II

Session Chair:
Danielle Alessio
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #118
Hadamard Factorization of Stable Polynomials
Carlos Loredo and Baltazar Aguirre, Universidad Autónoma Metropolitana (Mexico)

15:45 - 16:15 • #220
Takens-Bogdanov Bifurcation Analysis in Indirect Field-Oriented Control of Induction Motors
Fernando Verduzco and Francisco A. Carrillo-Navarro, Universidad de Sonora (Mexico)

16:15 - 16:45 • #255
On an Application of Hybrid Method to Solving Second Ordinary Differential Equations
Mehdiyeva Galina, Imanova Mehriban, and Vagif Ibrahimov , Baku State University (Azerbaijan)

Friday, July 29 – 15:15 - 16:45

Room BA202

CS-MECHE II
Computational Mechanics and Engineering II

Session Chair:
Rakesh Dhote
University of Toronto (Canada)

15:15 - 15:45 • #103
Numerical Solution of MHD Flow in a Semi-Infinite Channel Connected Electrodynamically by a Conductor
Canan Bozkaya and Munevver Tezer-Sezgin, Middle East Technical University (Turkey)

15:45 - 16:15 • #294
Numerical Bifurcation Study of Natural Convection in a Layer of Fluid Subject to Spatially Distributed Heating
Ali Asgarian, M. Zakir Hossain, and J. Maciej Floryan, University of Western Ontario (Canada)

16:15 - 16:45 • #315
Large-Eddy Simulation of Streamwise Rotating Turbulent Thermal Channel Flows Based on Dynamic Nonlinear Subgrid-Scale Models
Ye Zhang and Bing-Chen Wang, University of Manitoba (Canada)

Room BA208

CS-CACO II
Computational Algebra, Combinatorics, and Optimization

Session Chair:
Yuzhen Xie
University of Western Ontario (Canada)

15:15 - 15:45 • #116
Minimal Equations of Genus Two Curves over their Fields of Definition
Kevin Pate and Tony Shaska, Oakland University (USA)

15:45 - 16:15 • #298
On the Bounded Integer Partition
Sung-Hyuk Cha, Pace University (USA)

16:15 - 16:45 • #331
Accelerating Linear System Solutions Using Randomization Techniques
Marc Baboulin[1], Jack Dongarra[2], Julien Herrmann[3], and Stanimire Tomov[2], [1]INRIA/University Paris-Sud (France) [2]University of Tennessee (USA) [3]INRIA/ENS Lyon (France)

Room BA209

SS-AAIP II
Applied Analysis and Inverse Problems II

Session Chairs:
Marcus Garvie and Herb Kunze, University of Guelph (Canada)

15:15 - 15:45 • #31
A New Algorithm for Estimating Parameters in Reaction-Diffusion Systems That Display Pattern Formation
Marcus Garvie[1], Philip Maini[2], and Catalin Trenchea[3], [1]University of Guelph (Canada) [2]University of Oxford (United Kingdom) [3]University of Pittsburgh (USA)

15:45 - 16:15 • #62
Using the Nonlinear Lax-Milgram Representation Theorem to Solve Inverse Problems for Nonlinear Reaction-Diffusion Equations at Steady-State
Kim Levere, University of Guelph (Canada)

16:15 - 16:45 • #115
Inverse Problems in Finite and Infinite Dimensional Spaces with Applications in Biomathematics
Herb Kunze[1], Davide La Torre[2], and Edward Vrscay[3], [1]University of Guelph (Canada) [2]Universita Degli Studi di Milano (Italy) [3]University of Waterloo (Canada)

Room BA210

SS-CC III
Computational Chemistry III

Session Chair:
Randall Dumont
McMaster University (Canada)

15:15 - 15:45 • #183
Accurate Total Energies from the Model Potential of van Leeuwen and Baerends
Alex P. Gaiduk and Viktor N. Staroverov, University of Western Ontario (Canada)

15:45 - 16:15 • #192
Non-Local Uniform Electron Gas Based Functionals for Real Systems
Rogelio Cuevas-Saavedra and Paul Ayers, McMaster University (Canada)

16:15 - 16:45 • #193
Addressing the Coulomb Potential Singularity: A Basis Set Approach
Rogelio Cuevas-Saavedra and Paul Ayers, McMaster University (Canada)

Room BA211

SS-TAF II
Theory and Applications in Finance II

Session Chair:
Joe Campolieti
Wilfrid Laurier University (Canada)

15:15 - 15:45 • #316
Did CDS Trading Improve the Market for Corporate Bonds?
Sanjiv Das[1], Madhu Kalimipalli[2], and Subhankar Nayak[2], [1]Santa Clara University (USA) [2]Wilfrid Laurier University (Canada)

15:45 - 16:15 • #325
Nonlinear FBSDEs Related to Quadratic Term-Structure Models
Cody Hyndman and Xinghua Zhou, Concordia University (Canada)

16:15 - 16:45 • #327
Valuing Guaranteed Withdrawal Products with Continuous Management Fee
Sebastian Jaimungal[1], Ryan Donnelly[1], and Dmitri Rubisov[2], [1]University of Toronto (Canada) [2]BMO Capital Markets (Canada)

Friday, July 29 – 17:15 - 18:45

Room BA101

SS-MB III
Recent Advances in Mathematical Biology III

Session Chair:
Yuming Chen
Wilfrid Laurier University (Canada)

17:15 - 17:45 • #221
A Model for the Effect of Chemotherapy on the Hematopoietic System
Jacques Bĺair, Université de Montréal (Canada)

17:45 - 18:15 • #286
Non-Invasive Dermal and Transdermal Delivery Systems for Macromolecules
Marianna Foldvari, Torin Huzil, Mohammad Kohandel, and Siv Sivaloganathan, University of Waterloo (Canada)

Room BA102

CS-MODELING III
Partial Differential and Integral Equations in Mathematical Modeling III

Session Chair:
Sanjay Prabhakar
Wilfrid Laurier University (Canada)

17:15 - 17:45 • #279
Modelling Magnetic Field Profiles near Surface of Rough Boundary Superconductors
Michael Lindstrom, Brian Wetton, and Rob Kiefl, University of British Columbia (Canada)

17:45 - 18:15 • #303
A Second Order Time Scheme for the Landau-Lifshitz-Gilbert Equation
Evaggelos Kritsikis[1], Jean-Christophe Toussaint[1], and Francois Alouges[2], [1]Institut Neel (France) [2]CMAP (France)

Room BA112

SS-SND III
Symmetry in Nonlinear Dynamics: Applications and Numerics III

Session Chair:
Manuele Santoprete
Wilfrid Laurier University (Canada)

17:15 - 17:45 • #408
Spacecraft Attitude Control with Internal Momentum Wheels
Dong Eui Chang[1], R. Bayadi[2], and R. Banavar[2], [1]University of Waterloo (Canada) [2]IIT, Bombay (India)

17:45 - 18:15 • #41
Symmetrical Rearrangement Approach to Constructions of Energy Minimisers
Marina Chugunova, University of Toronto (Canada)

18:15 - 18:45 • #407
An Integrable System from Complex Geometry
Alex Castro, University of Toronto (Canada)

Room BA113

Room BA201

CS-DSDE II
Applications of Dynamical Systems and Differential Equations II

Session Chair:
Danielle Alessio
Wilfrid Laurier University (Canada)

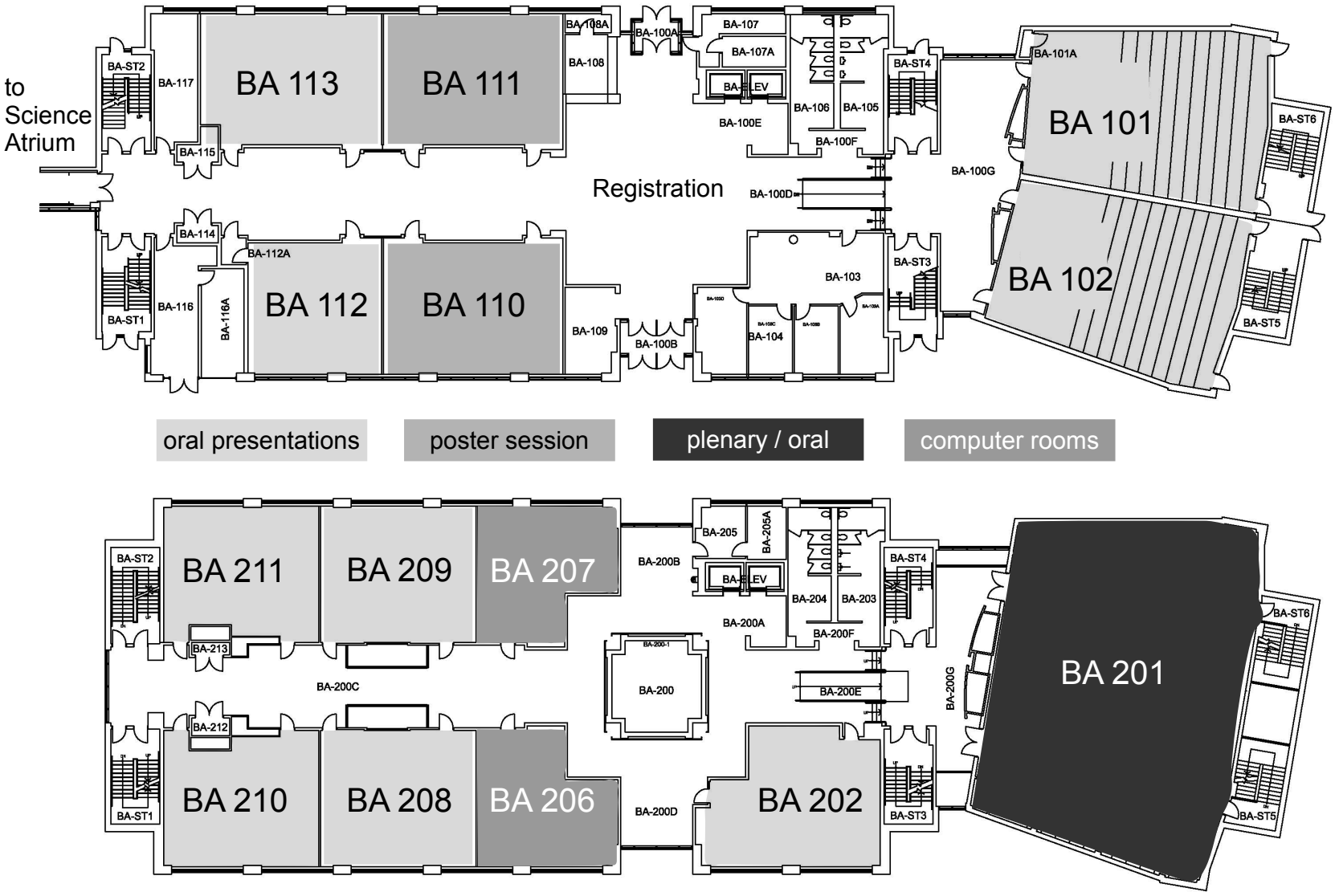
17:15 - 17:45 • #345
Mathematical Results for some Alpha Models of Turbulence with Critical and Subcritical Regularizations
Hani Ali, Rennes 1 university (France)

17:45 - 18:15 • #385
Extending the Nonsymmetric Super Time Stepping Method to Nonlinear Parabolic Equations
Katharine Gurski, Howard University (USA)

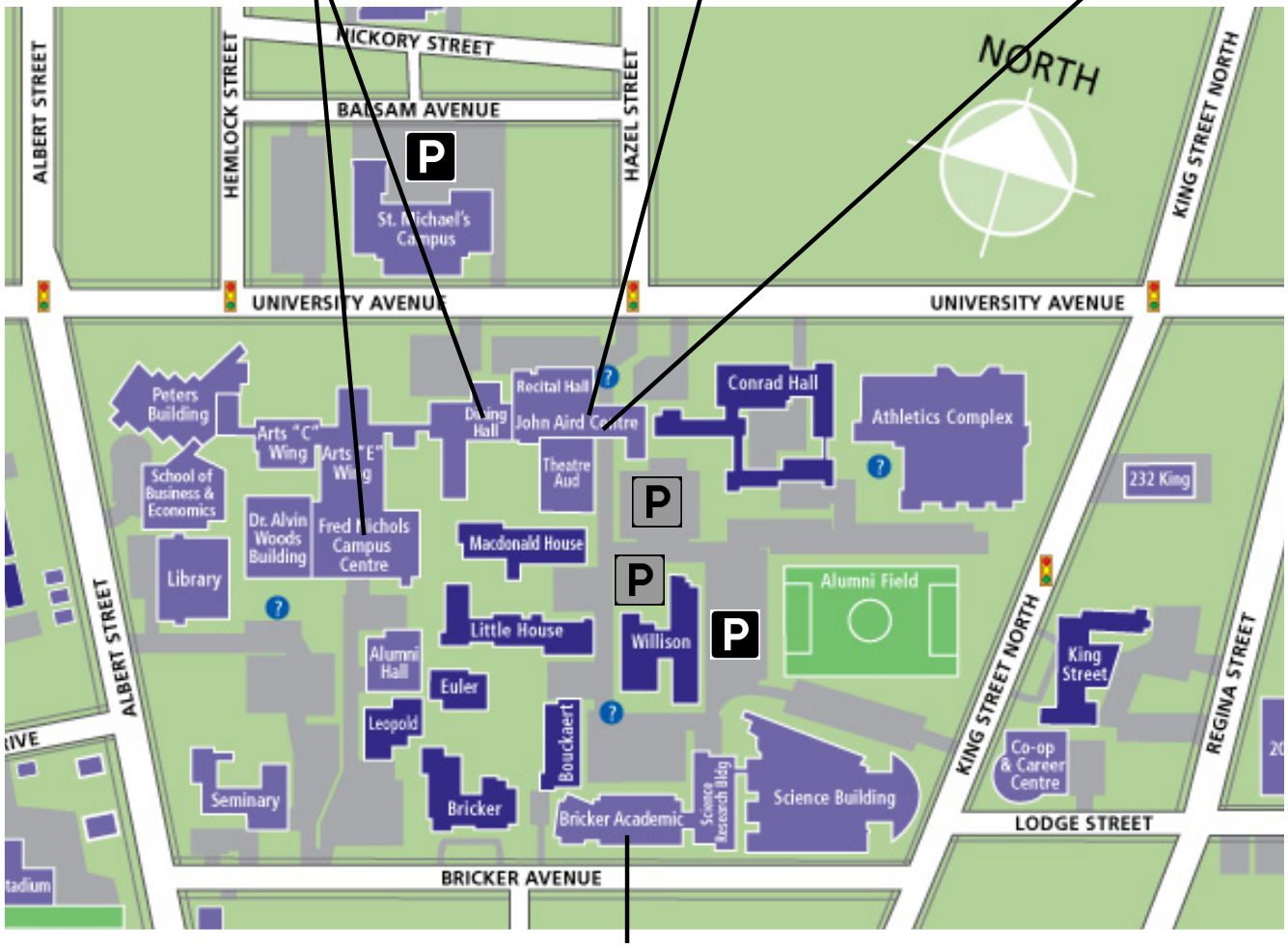
Friday, July 29 – 17:15 - 18:45

Room BA202	Room BA208	Room BA209	Room BA210	Room BA211
		SS-AAIP II Applied Analysis and Inverse Problems II **Session Chairs**: *Marcus Garvie and Herb Kunze, University of Guelph (Canada)*		**SS-TAF II** Theory and Applications in Finance II **Session Chair**: Joe Campolieti *Wilfrid Laurier University (Canada)*
		17:15 - 17:45 • #216 **A Multiple Prior Monte Carlo Method for the Backward Heat Diffusion Problem.** *Antoine Zambelli, University of California, Berkeley (USA)*		17:15 - 17:45 • #374 **Optimal Portfolios Regime Switching** *Luis Seco, University of Toronto (Canada)*
		17:45 - 18:15 • #295 **Analysis of Monotonic Discretizations for ODE Parameter Estimation** *Allan Willms[1] and Emily Szusz[2], [1]University of Guelph (Canada) [2]University of Strathclyde (United Kingdom)*		17:45 - 18:15 • #392 **IPO Pricing and Wealth Allocation** *Ning Tang, Andriy Shkilko, and Fabricio Perez, Wilfrid Laurier University (Canada)*
				18:15 - 18:45 • #404 **Cost Efficiency Same Bang for Fewer Bucks** *Phelim Boyle, Wilfrid Laurier University (Canada)*

Maps - Bricker Academic Building

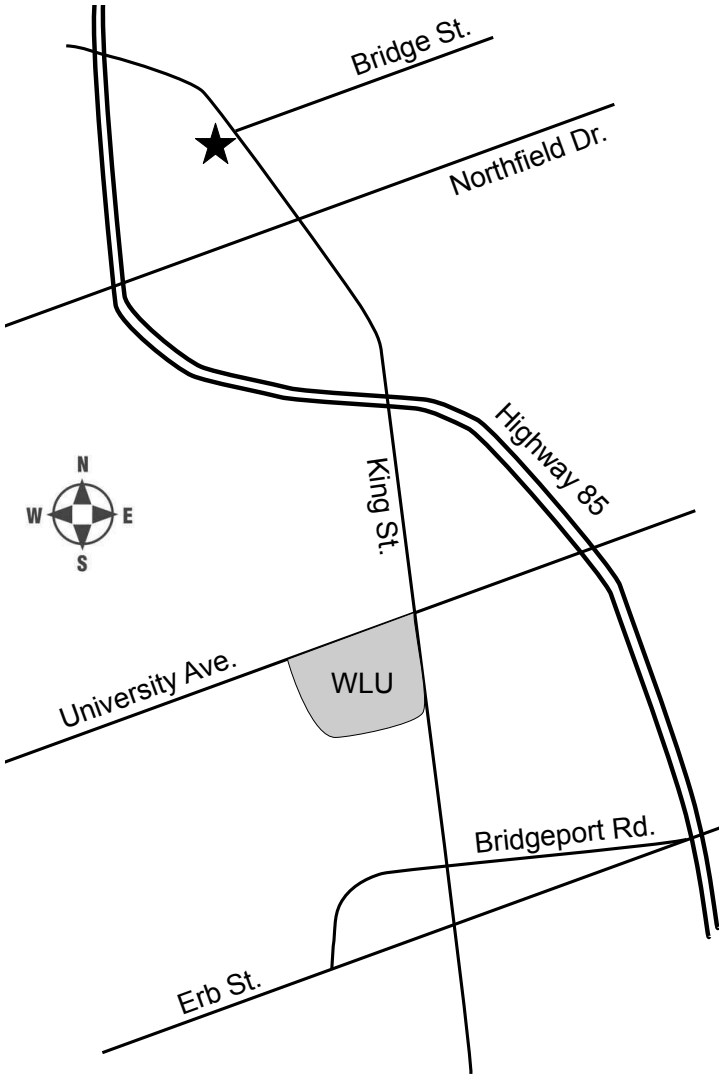


Maps - Wilfrid Laurier University Campus



Maps - Directions to the Conference Banquet

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



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