

AMMCS 2017

INTERNATIONAL CONFERENCE



AUGUST 20-25

WATERLOO, ONTARIO, CANADA

CONFERENCE PROGRAM

Program Chair

Herb Kunze



Mathematics and Computation in Biological Sciences and
Partial Differential and Integral Equations in Medicine
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 Modelling
Mathematical Modelling in Environmental Sciences
Mathematics and Computation in Biological Sciences and Medicine
Partial Differential and Integral Equations in Mathematical Modeling
Applications of Dynamical Systems and Differential Equations

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1. Acknowledgments

Scientific Committee	Alberto Bressan Kevin Burrage Ian Frigaard Carlos Garcia-Cevera Anatoli Ivanov Eduard Kirr Raytcho Lazarov Shaofan Li John Lowengrub Boris Malomed Vakhtang Putkaradze Enrico Scalas Chi-Wang Shu Konstantina Trivisa Dimitri Vvedensky Nicholas Zabarav		Pennsylvania State University QUT & University of Oxford University of British Columbia University of California, Santa Barbara Pennsylvania State University University of Illinois, Urbana-Champaign Texas A&M University University of California, Berkeley University of California, Irvine Tel Aviv University University of Alberta University of Sussex Brown University University of Maryland Imperial College London University of Warwick			
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2. Welcome

Welcome to the IV AMMCS International Conference

On behalf of the Organizing, Scientific, and Technical Committees of the 2017 AMMCS International Conference, we would like to welcome you to this exciting event held from August 20 through 25, 2017 on the Waterloo Campus of Wilfrid Laurier University.

AMMCS-2017 is an international and interdisciplinary conference, the fourth in a series of AMMCS meetings held in Waterloo, Ontario, Canada. The AMMCS Conference Series aims to promote interdisciplinary research and collaboration involving mathematical and computational sciences within the larger international community, highlighting recent advances in Applied Mathematics, Modeling and Computational Science. The previous congress in this series, the third, combined the AMMCS and CAIMS meetings, while the first AMMCS meeting in 2011 was a satellite event of the International Congress on Industrial and Applied Mathematics held in Vancouver.

This year the AMMCS Conference has an exciting scientific program featuring about 40 special and contributed sessions in several parallel tracks, 9 one-hour plenary presentations given by distinguished scientists and mathematicians, as well as 3 semi-plenary and award speakers. A number of student prizes and young researcher awards will be presented, including the AMMCS Kolmogorov-Wiener Prize for Young Researchers. Each day, the scientific program of the Conference will start with a plenary session featuring one of our nine distinguished plenary speakers. The scientific program of the Conference has been designed to provide a unique opportunity for in-depth technical discussions and exchange of ideas in applied mathematics, computational science and mathematical modeling, including their applications in natural and social sciences, engineering and technology, industry, finance, economics, and management.

We are proud that this Conference follows the AMMCS tradition of promoting interdisciplinary research. It is held on the Waterloo campus of Wilfrid Laurier University, the oldest university in the Cambridge-Kitchener-Waterloo-Guelph area. This beautiful part of Southwestern Ontario is a comfortable drive 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 everyone involved in this putting on this event. In particular, we would like to express our sincere thanks to the special session organizers, to all the authors who submitted the valuable results that form the basis of conference, and to our sponsors. Thank you for helping to make AMMCS-2017 a dynamic, enjoyable, and professionally fulfilling event.

We hope that every attendee will have an opportunity to enjoy this beautiful part of the world, and we hope that you will find AMMCS-2017 to be an intellectually inspiring and socially satisfying experience that you can take home with you.

Marc Kilgour and Roderick Melnik
The IV AMMCS International Conference General Chairs

3. Registration

The AMMCS Conference registration desk is located in Lazaridis Hall, Sunday through Friday. It will be staffed at the following times:

Day	Time	Location
Sunday, August 20	16:00-18:00 19:00-21:00	Lazaridis Hall Atrium
Monday, August 21	7:30-11:30 13:30-15:30	Lazaridis Hall Atrium
Tuesday, August 22	8:00-11:00 13:30-15:30	Lazaridis Hall Atrium
Wednesday, August 23	8:00-11:00 13:30-15:30	Lazaridis Hall Atrium
Thursday, August 24	8:00-11:00 13:30-15:30	Lazaridis Hall Atrium
Friday, August 25	8:00-11:00	Lazaridis Hall Atrium



4. Information

Hyperlinks	<p>Other than in this remark,</p> <ul style="list-style-type: none"> • blue text signifies hyperlinks within this document • magenta text signifies external hyperlinks 	
Wireless Network	<p>Congress delegates have free wireless internet service on the Wilfrid Laurier University campus.</p>	<p>For connection information and to obtain a password</p> <ul style="list-style-type: none"> • please go to the registration desk.
Computers	<p>Room LH3034 contain four computers that are available for use by Congress delegates.</p>	<p>For login information</p> <ul style="list-style-type: none"> • please go to the registration desk.
<p>Parking</p> <p>For more details on Visitor Parking Options, please visit the WLU Website.</p>	<p>Congress delegates have the following parking options.</p> <p>Pay & Display parking is available, seven days a week, in Lots 4, 10 & 20. Please refer to a campus map for these locations.</p> <p>Metered parking is available in Lot 3A.</p> <p>There is street parking available as per signage indicated.</p>	<p>For login information</p> <ul style="list-style-type: none"> • please go to the registration desk. <p>Pay & Display can be accessed for \$3/hour (with a seven (7) minute time minimum) or a \$9/day flat rate (from 7:00-23:00). The machine accepts quarters, one and two dollar coins, Visa, and Mastercard.</p> <p>Meters in lot 3A accept credit card payments.</p> <p>Please be advised that this parking is monitored by the City of Waterloo and there is a three-hour maximum.</p>
Public Transit	<p>Wilfrid Laurier University is serviced by routes 7, 8, 12, 29, 200, and 201 on University Ave. West and King St. North.</p>	<p>Route maps are available at</p> <ul style="list-style-type: none"> • the registration desk • www.grt.ca.

5. Events

([Campus Maps](#))

Day	Time	Event	Location	Details
Sunday August 20	19:00-21:00	Welcoming Reception	Lazaridis Hall Atrium	An informal social get-together, with food and drinks served. A conference registration table will be open.
Wednesday August 23	9:30-10:00 14:30-15:00	Congress Poster Session	Lazaridis Hall Hallways	Poster sessions over Wednesday's coffee breaks
Thursday August 24	12:00-12:30	Congress Photo Shoot	Lazaridis Hall Atrium	Meet in Lazaridis Hall lobby the Congress photo shoot
Thursday August 24	18:30-22:00	Congress Banquet Dinner	The Delta Hotel 110 Erb Street West (Directions)	Banquet tickets will be part of your registration package if you purchased them in advance. Tickets will also be available for purchase at the registration desk until 15:30 on Wednesday, August 23, at a cost of \$50 plus HST. Parking at the hotel is complimentary. Reception starts at 18:30, and banquet itself starts at 19:00.
Friday August 25	15:00-15:45	Maplesoft Session	LH2066	See next page .
Friday August 25	16:30-17:00	Congress Prizes, Closing	LH1001	Announcement and awarding of the Congress Prizes, and the closing of the Congress.

Join us for a Maple Presentation at AMMCS 2017!

Maple™ is math software that combines the world's most powerful math engine with an interface that makes it extremely easy to analyze, explore, visualize, and solve mathematical problems. Mathematicians and scientists around the world use Maple in their research to advance knowledge and better understand the world around us.



AMMCS Presentation: What's New in Maple 2017

Speaker: Dr Jürgen Gerhard, Senior Director of Research,
Maplesoft

Friday August 25, 2017

3:00 pm -3:45 pm

Lazaridis Hall, LH2066

Join us at this presentation where we will highlight some of the new features in Maple 2017, including symbolic summation and integration, series and limits, MapleCloud, world maps, graph theory, Appell functions, PDEs with boundary conditions, Gröbner bases, and Plot Builder, as well as a number of application examples.

Maple: A Powerful Research Tool

- **Over 5000 functions covering virtually every area of mathematics**, including algebra, differential equations, statistics, calculus, linear algebra, graph theory, differential geometry, number theory, and much more
- **Symbolic, numeric, and hybrid** computation algorithms
- **World-leading algorithms** for solving problems that are beyond the reach of any other software system
- **Sophisticated 2-D and 3-D plotting** and animations
- Efficient algorithms and tools for **high performance computing** and large-scale problem solving
- **Sophisticated programming language** designed for mathematics
- **Rich authoring environment** for creating technical documents and applications

6. Congress Student Prizes and Young Researcher Award

The Congress Prizes will be announced and awarded at the closing of the Congress on Friday, August 25, 16:30-17:00, in LH1001.

There are four student prizes, open to undergraduate and graduate students, described in the following table.

AMMCS 2017 Prize	Description: To be eligible,
Best Poster	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 related to the content of the poster with a judging panel.
Best Student Paper in a Special Session (SS)	the student must be a co-author of the work and present it during a special session or minisymposium.
Best Student Paper in a Contributed Session (CS)	the student must be a co-author of the work and present it during a contributed session.

One additional award is open to young researchers, meaning recent Ph.D. graduates and postdoctoral fellows under the age of 35.

AMMCS 2017 Award	Description: To be eligible,
Kolmogorov-Wiener Prize for Young Researchers	the young researcher must a. have earned their PhD degrees within 5 years of January 1 of the year of the award; b. have at least two peer refereed publications, minimum one of which has appeared in an internationally recognized journal; c. have presented their talks at an AMMCS event in the year of the award.

7. Congress Plenary Lectures

Friday, August 25, 13:30-14:30, in Room LH1001

Ivet Bahar, University of Pittsburgh

About the speaker: Ivet Bahar is currently Distinguished Professor and the Founding Chair of the Department of Computational and Systems Biology at the University of Pittsburgh, School of Medicine, and Associate Director of the U of Pittsburgh Drug Discovery Institute. She co-founded the first PhD degree-granting program between Carnegie Mellon University and the University of Pittsburgh, selected by the Howard Hughes Medical Institute and the National Institutes of Health as one of 10 national programs to offer interdisciplinary training at the interface between biological, physical and computational sciences. Dr. Bahar is a leader in theoretical and computational biophysics of protein dynamics, and multiscale modeling of complex biological systems and processes. She is known for her pioneering work on the development and application of elastic network models toward elucidating the structural dynamics of large biomolecular systems. Her studies have highlighted the significance of structure-encoded fluctuations in enabling functional interactions. She is an elected member of the European Molecular Biology Organization (EMBO). She has more than 250 publications in scientific journals, with > 17,000 citations and an H-index of 66.



Learning from Elastic Network Models: From Proteins to Chromatin Dynamics

Elastic network models proved to be powerful tools for exploring the collective dynamics of biomolecular systems in the last two decades. Numerous examples demonstrate their applicability to a broad range of phenomena, from allosteric transitions, to modeling protein-substrate interactions key to regulation and signaling events, to supramolecular machinery. Recent advances in cryo-EM characterization of big structures as well as genome-scale identification of 3D contacts between gene loci now open the way to a new level of applications, including the exploration of the 3D structural dynamics of the chromosomes, with the help of elastic network models, further supporting their utility as a tool applicable across multiple scales, from molecules to genome-wide associations.

Congress Plenary Lectures

Wednesday, August 23, 13:30-14:30, in Room LH1001

Vincent Conitzer, Duke University

About the speaker: Vincent Conitzer is the Kimberly J. Jenkins University Professor of New Technologies and Professor of Computer Science, Professor of Economics, and Professor of Philosophy at Duke University. He received Ph.D. (2006) and M.S. (2003) degrees in Computer Science from Carnegie Mellon University, and an A.B. (2001) degree in Applied Mathematics from Harvard University. Most of his research is on artificial intelligence (especially multiagent systems) and economic theory (especially game theory, social choice, and mechanism design). Conitzer has received the Social Choice and Welfare Prize, a Presidential Early Career Award for Scientists and Engineers (PECASE), the IJCAI Computers and Thought Award, an NSF CAREER award, the inaugural Victor Lesser dissertation award, an honorable mention for the ACM dissertation award, and several awards for papers and service at the AAAI and AAMAS conferences. He has also been named a Guggenheim Fellow, a Kavli Fellow, a Bass Fellow, a Sloan Fellow, and one of AI's Ten to Watch. Conitzer and Preston McAfee are the founding Editors-in-Chief of the ACM Transactions on Economics and Computation (TEAC).



Moral Artificial Intelligence and the Societal Tradeoffs Problem

AI systems increasingly need to make decisions with a moral component. Should a self-driving car prioritize the safety of its passengers over that of others, and to what extent? Should an algorithm that decides which donors and patients to match in a kidney exchange take features such as the patient's age into account, and to what extent? I will briefly discuss two approaches to these problems: extending game-theoretic frameworks, and learning from examples of human decisions.

Under the second approach, we will generally find that not all humans agree! How, then, should we aggregate their judgments to make coherent decisions? This is a problem in computational social choice. I will present our work on the societal tradeoffs problem in which, based on multiple human judgments, we aim to find a specific value for x in statements such as using one gallon of gasoline is as bad as creating x bags of landfill trash.

The first part is joint work with Walter Sinnott-Armstrong, Jana Schaich Borg, Yuan Deng, and Max Kramer, and the second part with Rupert Freeman, Markus Brill, and Yuqian Li.

Congress Plenary Lectures

Tuesday, August 22, 8:30-9:30, in Room LH1001

André Longtin, University of Ottawa

About the speaker: André Longtin is the University Research Chair in Neurophysics at the University of Ottawa, as well as Chairman of its Physics Department. He runs the Neurophysics and Nonlinear Dynamics Group, working at the interface of physics, applied mathematics, biology and medicine. His main interests lie in theoretical and computational neuroscience and the interaction of deterministic systems with noise. He received an honours B.Sc. Physics in 1983 and M.Sc. Physics in 1985 from the Université de Montréal, and his Ph.D. in Physics from McGill University in 1989. He joined Los Alamos National Laboratory as an NSERC Postdoctoral Fellow and a Los Alamos Director's Funded Fellow, where he held a joint position in the Theoretical Division T13 (Complex Systems) and the Center for Nonlinear Studies. He began as assistant professor of Physics in 1992 at the University of Ottawa. He is Professor since 2002, and cross-appointed to the Departments of Cellular and Molecular Medicine and of Mathematics and Statistics. He is founding co-director of the University of Ottawa Center for Neural Dynamics and a Fellow of the American Physical Society. He sits on the editorial board of Biological Cybernetics, Cognitive Neurodynamics, Bulletin of Mathematical Biology, Journal of Mathematical Neuroscience and Frontiers in Computational Neuroscience. He was awarded a Premiers Research Award in 1999, the inaugural award for Interdisciplinary research at U. Ottawa in 2004 (with Len Maler), a senior Humboldt Research Prize in 2010, and the NSERC Brockhouse Canada Prize in Interdisciplinary Research with Len Maler in 2017 for uncovering key features of the neural code.



The Mathematical Limits of Sensory Integration and Control

Theoretical studies of brain function have led to advances in a number of areas of applied mathematics. Recent advances are highlighted here in the context of sensory systems. These systems provide a particularly good window onto questions of neural dynamics, control and information processing, because they have a well-characterized physical input. This talk will first present recent work on information processing at the limits of sensory detection. The probabilistic encoding of sensory signals as modulations of intrinsically correlated neural point processes is shown to enhance their detectability and information content as sequences of firing or “spike” times. Downstream neurons further aim to derive optimal information about the position of objects in the environment. Their sensitivity is found to peak at a characteristic distance where the Fisher information is maximized. This result relies on a correction to the Fisher information for the positive correlations observed in the stochastic firing patterns. It provides a first mathematical description of a sensory focus, and this focal point corresponds to the transition from periodic to chaotic dynamics. Finally we discuss a stochastic optimal control problem to precisely target the spike times of a leaky integrate-and-fire (LIF) model of a neuron with noise. Such a model is in fact an Ornstein-Uhlenbeck process with an absorbing boundary, for which we are controlling the mean first passage time. The optimal control problem is solved using dynamic programming when the controller has access to the voltage (closed-loop control), and using a maximum principle for the transition density when the controller only has access to the spike times (open-loop control).

Congress Plenary Lectures

Wednesday, August 23, 8:30-9:30, in Room LH1001

Kavita Ramanan, Brown University

About the speaker: Kavita Ramanan is a professor at the Division of Applied Mathematics at Brown University. She previously held positions as professor of mathematics at Carnegie Mellon University and a Member of Technical Staff at Bell Laboratories. Her research lies in the area of probability theory, stochastic processes and their applications, including stochastic analysis, high-dimensional probability, large deviations, and applications to stochastic networks. She was awarded the Erlang Prize for outstanding contributions to applied probability by the INFORMS Applied Probability Society in 2006, was elected a fellow of the IMS (Institute for Mathematics and Statistics) in 2013 and was awarded the IMS Medallion in 2015. She has served on the editorial boards of several journals, including the Annals of Probability, Annals of Applied Probability, Queueing Systems and Stochastic Analysis and Applications, and is currently the Area Editor of Mathematics of Operations Research. She is the faculty founder of the AWM student chapter at Brown University and also runs a math outreach group at Brown called the Math CoOp.



Scaling Limits of Stochastic Networks

Stochastic networks arise in a variety of applications, ranging from communication and service networks to biochemical reaction networks. In many cases, these networks are too complex to be amenable to an exact analysis, and so it is useful to identify tractable approximations that provide qualitative insight into the dynamics, and whose accuracy can be rigorously justified via limit theorems in a suitable asymptotic regime. This talk will provide a survey of mathematical methods that have been developed to identify and analyze these scaling limits in different settings, and the qualitative insight they provide into network performance and design. We will also provide some illustrative examples of how the mathematical tools developed to analyze stochastic networks have been applied in other areas of probability, for the study of interacting particle systems, random matrices, and models in math finance.

Congress Plenary Lectures

Thursday, August 24, 13:30-14:30, in Room LH1001

Harvey Stein, Bloomberg LP and Columbia University

About the speaker: Harvey J. Stein is Head of the Quantitative Risk Analytics Group at Bloomberg, responsible for all quantitative aspects of Bloomberg's risk analysis products. Dr. Stein is well known in the industry, having published and lectured on mortgage backed security valuation, CVA calculations, interest rate and FX modeling, credit exposure calculations, financial regulation, and other subjects. Dr. Stein is also a member of the board of directors of the IAQF, an adjunct professor at Columbia University, a board member of the Rutgers University Mathematical Finance program and of the NYU Enterprise Learning program, and organizer of the IAQF/Thalesians financial seminar series. He received his BA in mathematics from WPI in 1982 and his PhD in mathematics from UC Berkeley in 1991.



Big Data's Dirty Secret

“Let the data speak for themselves.” “We apply machine learning to the problem of...”

These are two commonly heard phrases these days. But what data exactly are we speaking about, and what do we intend to do with it? What is ignored all too often is the quality of the data being used and how it impacts the analyses being done. Are there holes in the data? Are there anomalies? Given how dirty data can be, a more apt phrase might be “Garbage in, garbage out.”

In this talk we will discuss some of the data problems we've encountered in financial data, and approaches that can be used to address them. Our particular focus will be on techniques we've employed to deal with missing data and bad data in credit default swap (CDS) spread histories.

Congress Plenary Lectures

Thursday, August 24, 8:30-9:30, in Room LH1001

Francis Edward Su, Harvey Mudd College

About the speaker: Francis Edward Su is the Benediktsson-Karwa Professor of Mathematics at Harvey Mudd College, and Past-President of the Mathematical Association of America. He received his Ph.D. from Harvard University under Persi Diaconis. He will be Chern Professor at MSRI during Fall 2017, co-organizing a semester on Geometric and Topological Combinatorics. His research is in this area, with a focus on applications to the social sciences, and he has received multiple NSF research grants for his work. He serves as an Associate Editor for the SIAM Journal on Discrete Mathematics. He also has a passion for teaching and popularizing mathematics. From the Mathematical Association of America, he received the 2001 Hasse Prize for expository writing, and the 2013 Haimo Award for distinguished teaching. He authors the popular Math Fun Facts website and is creator of “MathFeed,” the math news app.



A Polytopal Generalization of Sperner's Lemma

Sperner's lemma is a statement about labelled triangulations of simplices whose applications include: finding fixed points of highly nonlinear functions, and computing Nash equilibria in game theory. With J. DeLoera and E. Peterson, we prove a polytopal generalization of Sperner's lemma to polytopes in two different ways, one constructive and one non-constructive, and give applications of this result: to cake-cutting problems, to minimal triangulations of polytopes, and to the game of Hex.

Congress Plenary Lectures

Tuesday, August 22, 13:30-14:30, in Room LH1001

Alessandro Vespignani, Northeastern University

About the speaker: Prof. Vespignani received his undergraduate degree and Ph.D., both in physics and both from the University of Rome “La Sapienza,” in 1990 and 1994 respectively. He completed his postdoctoral research at Yale University and Leiden University. Prof. Vespignani worked at the International Center for Theoretical Physics (UNESCO) in Trieste and at the University of Paris-Sud in France as a member of the National Council for Scientific Research (CNRS) before moving to Indiana University in 2004. Before joining Northeastern University Vespignani was J.H.Rudy Professor of Informatics and Computing at Indiana University and serving as the Director of the Center for Complex Networks and Systems Research and the Associate Director of the Pervasive Technology Institute. Vespignani is elected fellow of the American Physical Society, member of the Academy of Europe, and fellow of the Institute for Quantitative Social Sciences at Harvard University. He is serving in the board/leadership of a variety of professional association and journals and the Institute for Scientific Interchange Foundation.



Mathematical and Computational Modeling of Epidemics Does More Than Forecast

Recent years have witnessed the development of data driven models of infectious diseases rooted in the combination of largescale data mining techniques, computational approaches and mathematical modeling. Although these models are increasingly used to support public-health decisions they are often under debate by only considering their value as forecasting tools. Here I will discuss, by using specific modeling examples of the H1N1 pandemic and the West Africa Ebola epidemic, how computational models can be used in real time to provide situational awareness, intervention planning and projections, and the identification of factors that fundamentally influence the course of an outbreak.

Congress Plenary Lectures

Friday, August 25, 8:30-9:30, in Room LH1001

William Welch, University of British Columbia

About the speaker: Will Welch joined the Department of Statistics, UBC as a Professor in 2003 and was Head of Department from 2003 until 2008. Prior to that he was at the University of Waterloo for 16 years. He also holds the honorary title of Visiting Professor in the Business School, Loughborough University, UK.

Welch's research spans computer-aided design of experiments, quality improvement, the design and analysis of computer experiments, statistical methods for drug discovery, and machine/statistical learning. The work is highly cited: please see [Google Scholar](#). In 2000 he won the American Statistical Association's Statistics in Chemistry Prize.

Welch has served on the editorial boards of the *Annals of Applied Statistics*, the *Canadian Journal of Statistics*, and the *Journal of Uncertainty Quantification*. He has also served as Associate Director of the Canadian Statistical Sciences Institute (CANSSI).



Gaussian Processes and the Statistical Analysis of Computer Experiments

The presentation will be in three parts: the history, the current use, and the future of Gaussian processes (GPs) in the statistical analysis of computer models.

1. Why are GPs popular for computer experiments? Over the last quarter century GPs have become widespread in statistical, engineering, and other disciplines for the analysis of computer models. Their popularity probably stems from three major advantages: (1) they adapt to nonlinear input-output relationships in a data-adaptive way; (2) they may require relatively few runs of the computer model (important if the computer code is computationally demanding) and (3) they provide a measure of prediction uncertainty that is often realistic even when modelling a deterministic function. These basic properties will be reviewed.
2. How are GPs used to achieve scientific and engineering objectives? Computer experiments are carried out with one or more of many purposes in mind: sensitivity analysis, calibration of unknown parameters, optimization, propagation of input uncertainty to statistical properties of the output, and so on. A broad overview of how GPs serve these goals will be given.
3. What about really complex phenomena? The sample size, i.e., number of computer-model evaluations, for decent prediction accuracy can be impractically large for some high-dimensional, complex computer codes and even for toy problems. Some recent work to adapt GPs to expand the functions that can be usefully modelled will be briefly described.

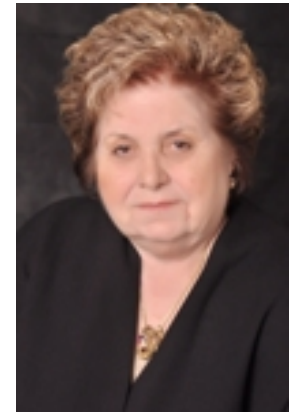
Congress Plenary Lectures

Monday, August 21, 9:00-10:00, in Room LH1001

Mary Wheeler, University of Texas at Austin

About the speaker: Mary Fanett Wheeler is a world-renowned expert in computational science. She has been a member of the faculty at The University of Texas at Austin since 1995 and holds the Ernest and Virginia Cockrell Chair in the departments of Aerospace Engineering and Engineering Mechanics, and Petroleum and Geosystems Engineering. She is also director of the Center for Subsurface Modeling (CSM) at the Institute for Computational Engineering and Sciences (ICES). Before joining the faculty at UT Austin, Dr. Wheeler was the Noah Harding Professor in engineering at Rice University in Houston. Professor Wheeler employs computer simulations to model the behavior of fluids in geological formations. Her particular research interests include numerical solution of partial differential systems with application to the modeling of subsurface flows and parallel computation. Applications of her research include multiphase flow and geomechanics in fractured porous media, contaminant transport in groundwater, and sequestration of carbon in geological formations. Wheeler has published more than 300 technical papers and edited seven books; she is currently an editor of five technical journals.

Professor Wheeler is a member of the Society of Industrial and Applied Mathematics and the Society of Petroleum Engineers. She is a Fellow of the International Association for Computational Mechanics and is a certified Professional Engineer in the State of Texas. She was co-organizer of the SIAM Activity Group in the Geosciences, and alongside Dr. Hans van Duijn, started the Journal on Computational Geosciences. She has served on numerous committees for the NSF and the DOE. For more than seven years she was the university lead in the DOD User Productivity Enhancement and Technology Transfer Program (PET) in environmental quality modeling. Dr. Wheeler has served on the Board of Governors for Argonne National Laboratory and on the Advisory Committee for Pacific Northwest National Laboratory. In 1998, Dr. Wheeler was elected to the National Academy of Engineering. In 2006, she received an honorary doctorate from Technische Universiteit Eindhoven in the Netherlands. In 2008, she received an honorary doctorate from the Colorado School of Mines. In 2009, Dr. Wheeler was honored with the SIAM Geosciences Career Prize, as well as her third IBM Faculty Award. That same year, she was awarded the Theodore von Krmn prize at the SIAM national meeting, recognizing her seminal research in numerical methods for partial differential equations, her leadership in the field of scientific computation and service to the scientific community, and for her pioneering work in the application of computational methods to the engineering sciences, most notably in geosciences. In 2010, she was elected to the American Academy of Arts and Sciences. In 2011, she received a Humboldt award. In February 2013, Dr. Wheeler was selected to receive the Lifetime Achievement Award of the International Society for Porous Media, InterPore. The award is given in recognition of her achievements in the area of subsurface flow and contaminant transport, and in recognition of her great contribution in increasing the visibility, credibility and prestige of porous media research. In May 2013, Dr. Wheeler received the John von Neumann Medal award from the United States Association for Computational Mechanics (USACM). It is the highest award given by USACM to honor individuals who have made outstanding, sustained contributions in the field of computational mechanics over substantial portions of their professional careers. In 2014, she was named an SPE honorary member, the organizations highest honor. In 2016, she received the ICES Moncreif Award.



Adaptive Enriched Galerkin Methods for Miscible Displacement in Porous Media

Miscible displacement of one fluid by another in a porous medium has attracted considerable attention in subsurface modeling with emphasis on enhanced oil recovery applications. Here flow instabilities arising when a fluid with higher mobility displaces another fluid with lower mobility is referred to as viscous fingering. The latter has been the topic of major physical and mathematical studies for over half a century. Recently, viscous fingering has been applied for proppant-filled hydraulic fracture propagation to efficiently transport the proppant to the tip of fractures. The governing mathematical system that represents the displacement of the fluid mixtures consists of pressure, velocity, and concentration.

Here we present a novel approach to the simulation of miscible displacement by employing an adaptive enriched Galerkin finite element methods (EG) coupled with entropy residual stabilization for transport. EG is formulated by enriching the conforming continuous Galerkin finite element method (CG) with piecewise constant functions. EG provides locally and globally conservative fluxes, which is crucial for coupled flow and transport problems. Moreover, EG has fewer degrees of freedom in comparison with discontinuous Galerkin (DG) and an efficient flow solver has been derived which allows for higher order schemes. We have shown theoretically and computationally that a robust preconditioner can be achieved if one adds pre- and post-smoothings to a block preconditioner involving CG and jumps in the discontinuous piecewise constants. Dynamic adaptive mesh refinement is applied in treating geological material discontinuities.

An additional advantage of EG is that only those subdomains that require local conservation need to be enriched with a treatment of high order non-matching grids. Our high order EG transport system is coupled with an entropy viscosity residual stabilization method introduced in to avoid spurious oscillations near shocks. Instead of using limiters and non-oscillatory reconstructions, this method employs the local residual of an entropy equation to construct the numerical diffusion, which is added as a nonlinear dissipation to the numerical discretization of the system. The amount of numerical diffusion added is proportional to the computed entropy residual. This technique is independent of mesh and order of approximation and has been shown to be efficient and stable in solving many physical problems with CG. Finally we note that it is crucial to have dynamic mesh adaptivity in order to reduce computational costs for large-scale three dimensional applications; both for flow and transport. We employ the entropy residual for dynamic adaptive mesh refinement to capture the moving interface between the miscible fluids. Our computational results indicate that the entropy residual can be used as an efficient a posteriori error indicator.

This is joint work with Sanghyun Lee and Young-Ju Lee (University of Texas at Austin).

8. Congress Semi-Plenary Lectures

Monday, August 21, 10:30-11:30, in Room LH3094

Walter L. Craig, McMaster University

About the speaker: Walter L. Craig is a Canadian mathematician, currently a Canada Research Chair in Mathematical Analysis and Applications at McMaster University. Craig earned his Ph.D. from New York University in 1981; his dissertation, *A Bifurcation Theory for Periodic Dissipative Wave Equations*, was supervised by Louis Nirenberg. In 2012, he became one of the inaugural Fellows of the American Mathematical Society.



Birkhoff Normal Form for Nonlinear Wave Equations

Many theorems on global existence of small amplitude solutions of nonlinear wave equations in \mathbb{R}^n depend upon a competition between the time decay of solutions and the degree of the nonlinearity. Decay estimates are more effective when inessential nonlinear terms are able to be removed through a well-chosen transformation. Additionally, most physically relevant wave equations can be formulated as Hamiltonian PDEs, and the analysis of their solutions can be considered in this context. In this talk, we construct Birkhoff normal forms transformations for the class of wave equations which are Hamiltonian PDEs and null forms, using the flow of an auxiliary Hamiltonian system. This gives a new proof via canonical transformations of the global existence theorems for null form wave equations of S. Klainerman and J. Shatah in space dimensions $n \geq 3$. The case $n = 2$ is also under consideration, which involves a normal forms interpretation of modified scattering.

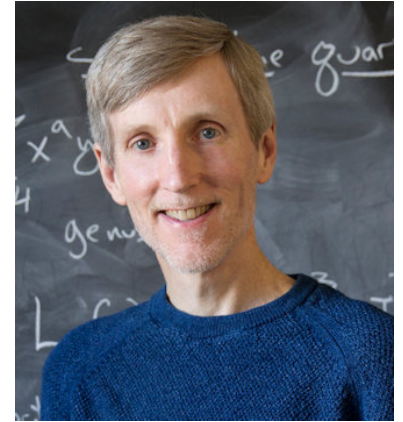
These results are work-in-progress with A. French and C.-R. Yang.

Congress Semi-Plenary Lectures

Tuesday, August 22, 15:00-16:00, in Room LH1009

Andrew Sutherland, MIT

About the speaker: Andrew Sutherland received his undergraduate degree in mathematics from MIT in 1990. Following a successful career as an entrepreneur in the software industry, he returned to MIT and completed his Ph.D. in 2007, winning the George M. Sprowles Prize for his thesis on order computations in generic groups. Sutherland is currently a Principal Research Scientist at MIT with a research focus in computational number theory and was recently awarded the Selfridge Prize for his work in this area. He has played a leading role in a number of large scale collaborations in open mathematics, including the polymath project on prime gaps and the L-functions and Modular Forms Database (LMFDB), and he serves on the editorial board of several journals, including Mathematics of Computation.



Computing Zeta Functions in Average Polynomial Time

Let X be a smooth projective curve defined over a finite field of prime order p . Determining the number of rational points on X , or more generally, computing the zeta function of X , is a core problem in computational number theory with many applications. For curves of genus $g = 1$, Schoof uses a CRT approach to obtain a polynomial-time algorithm; Schoof's algorithm has been generalized to curves of higher genus by Pila, with a running time that is polynomial in $\log p$ but exponential in g . Alternatively, p -adic approaches based on generalizations of Kedlaya's algorithm yield a running time that is polynomial in g but exponential in $\log p$. No algorithm with a running time that is polynomial in both g and $\log p$ is currently known.

Now suppose X is instead defined over the rational numbers, and consider the sequence of curves X_p obtained by taking the reductions of X modulo primes p of good reduction up to some bound N . The problem of computing the zeta functions of all the X_p naturally arises when one wishes to compute the L -function of X , or to study its Sato-Tate distribution. Harvey has shown that this problem can be solved in time quasi-linear in N ; the average time to compute the zeta function of each of the curves X_p is polynomial in both g and $\log p$.

I will report on practical implementations of this algorithm, focusing in particular on curves of genus 3, both hyperelliptic and non-hyperelliptic, where we have recently obtained results that are dramatically faster than using either a CRT or p -adic approach to compute the zeta function of each X_p individually.

9. AMMCS Prize-Winning Lecture

Kolmogorov-Wiener Prize for Young Researchers

Monday, August 21, 14:00-15:00, in Room LH1001

[Ben Adcock](#), Simon Fraser University

About the speaker: Benjamin Adcock received his PhD from the University of Cambridge in 2010. After his graduation, he received NSERC and PIMS Postdoctoral Fellowships and was carrying his research at Simon Fraser University. In 2012 he joined Purdue University as an Assistant Professor. Since August 2014 he is on the faculty of mathematics at Simon Fraser University. Dr. Adcocks research interests include applied and computational harmonic analysis, sampling theory, compressed sensing, as well as approximation theory and numerical analysis. He made original significant contributions to sampling theory and compressed sensing which have potential applications in the areas ranging from medical imaging to geophysical signal processing. At the time of the award, he has published twenty journal publications, most of which are in the top tier journals of his field. Dr. Adcocks work bridges the gap between theory and practice by developing and applying highly innovative mathematical tools.



From Global to Local: Getting More From Compressed Sensing

Over the last ten years, compressed sensing and sparse recovery techniques have had a great impact on applied mathematics and its uses in engineering and the physical sciences. An area of particular note is imaging, where sparse recovery techniques, guided by the theory of compressed sensing, are now beginning to be seen in commercial implementations. The aim of this talk is to revisit the mathematics of compressed sensing as it pertains to imaging. I shall first argue that standard theory, which is based on global properties, can be insufficient for imaging problems, which typically exhibit substantial local structure. Understanding how to best exploit this additional structure in practical imaging scenarios requires new mathematical insight. With this in mind, in the second half of the talk I will present a framework for compressed sensing based on new, local principles. This approach gives rise to novel sampling strategies for compressive imaging, leading to enhanced reconstruction quality in practical imaging systems. Moreover, it leads to a fundamentally new understanding of how compressed sensing can be most beneficial in practice: namely, as a resolution enhancement technique. In the final part of the talk I will demonstrate these results in a series of applications.

10. Special Sessions & Organizers

Session ID	Session Name	Session Organizers	Session Blocks
SS-AAIP	Inverse Problems	Herb Kunze (University of Guelph) Davide La Torre (Nazarbayev University & University of Milan)	SS-AAIP #1 Wednesday A.M. SS-AAIP #2 Wednesday P.M. SS-AAIP #3 Thursday A.M.
SS-ASQE	Analogue Signals In Quantum Environments: The Physics and Mathematics of Propagation and Control	Alexandre Zagoskin (Loughborough University) Artur Sowa (University of Saskatchewan)	SS-ASQE #1 Tuesday A.M. SS-ASQE #2 Tuesday P.M.
SS-CC	Computational Chemistry	Styliani Consta (University of Western Ontario) Myong In Oh(University of Western Ontario)	SS-CC Thursday A.M.
SS-CDAHS	Complex Data Analysis in Health Science	Sunny Wang (Wilfrid Laurier University) Giseon Heo (University of Alberta)	SS-CDAHS #1 Wednesday A.M. SS-CDAHS #2 Wednesday P.M.
SS-CNT	Computational Number Theory	Patrick Ingram (York University) Chester Weatherby (Wilfrid Laurier University)	SS-CNT #1 Tuesday A.M. SS-CNT #2 Tuesday P.M. SS-CNT #3 Wednesday A.M. SS-CNT #4 Wednesday P.M.
SS-DAG	Dynamics and Games	Manuele Santoprete (Wilfrid Laurier University) Alberto Adrego Pinto (University of Porto)	SS-DAG #1 Wednesday A.M. SS-DAG #2 Wednesday P.M.
SS-DASO	Data Analytics for System Optimization	Wenyong Feng (Trent University) Jimmy Huang (York University) Jianhong Wu (York University)	SS-DASO #1 Wednesday A.M. SS-DASO #2 Wednesday P.M.
SS-DETA	Delay Equations: Theory and Applications	Elena Braverman (University of Calgary) Anatoli Ivanov (Pennsylvania State University) Erik Verriest (Georgia Institute of Technology)	SS-DETA #1 Thursday P.M. SS-DETA #2 Friday A.M.
SS-FCA	Fractional Calculus and Applications	Richard Magin (University of Illinois at Chicago) Enrico Scalas (University of Sussex)	SS-FCA Tuesday A.M.
SS-FD	Fair Decisions	Marc Kilgour (Wilfrid Laurier University)	SS-FD #1 Thursday A.M. SS-FD #2 Thursday P.M.


Session ID	Session Name	Session Organizers	Session Blocks
SS-GLS	Geocomputational Landscapes and Spaces	Steven A. Roberts (Wilfrid Laurier University) Colin Robertson (Wilfrid Laurier University, University of Waterloo)	SS-GLS Tuesday P.M.
SS-GMCTA	Geometric Mechanics and Control: From Theory to Applications	Vakhtang Putkaradze (University of Alberta) Manuele Santoprete (Wilfrid Laurier University)	SS-GMCTA #1 Monday A.M. SS-GMCTA #2 Monday P.M.
SS-IM	Industrial Mathematics	Huaxiong Huang (York University) Pawel Pralat (Ryerson University) Tom Salisbury (York University) Tyler Wilson (Fields Institute)	SS-IM #1 Wednesday P.M. SS-IM #2 Thursday A.M.
SS-MFMCR	Mathematical Finance - Modeling, Computation and Risk Management	Joe Campolieti (Wilfrid Laurier University) Adam Metzler (Wilfrid Laurier University, University of Waterloo)	SS-MFMCR #1 Thursday A.M. SS-MFMCR #2 Thursday P.M.
SS-MMNN	Mathematical Models for Nanoscience and Nanotechnology	Hamed Majedi (University of Waterloo) Zoran Miskovic (University of Waterloo)	SS-MMNN #1 Friday A.M. SS-MMNN #2 Friday P.M.
SS-MSED	Modelling of Socio-economic Dynamics	Bertram Düring (University of Sussex) Enrico Scalas (University of Sussex)	SS-MSED Monday A.M.
SS-NDSA	Nonlinear Dynamical Systems and Applications	Xinzhi Liu (University of Waterloo) Mohamad Alwan (University of Waterloo) Kexue Zhang (University of Waterloo)	SS-MSMB #1 Friday A.M. SS-MSMB #2 Friday P.M.
SS-RAWP	Recent Advances in Mathematical and Computational Aspects of Wave Propagation	Eduard Kirr (University of Illinois at Urbana-Champaign) Nicolae Tarfulea (Purdue University Northwest)	SS-RAWP #1 Monday A.M. SS-RAWP #2 Monday P.M. SS-RAWP #3 Tuesday A.M. SS-RAWP #4 Tuesday P.M.
SS-RPNMSC	Recent progress in numerical methods and scientific computing	Rob Corless (University of Western Ontario) Dong Liang (York University) Justin Wan (University of Waterloo)	SS-RPNMSC #1 Monday A.M. SS-RPNMSC #2 Monday P.M. SS-RPNMSC #3 Tuesday A.M.
SS-TAVI	Theory and applications of variational inequalities	H. Ben-el-Mechaiekh (Brock University) M. Cojocaru (University of Guelph) K. Lan (Ryerson University)	SS-TAVI #1 Thursday A.M. SS-TAVI #2 Thursday P.M.

11. Contributed Sessions

Session ID	Session Name	Session Blocks
CS-APMRE	Applied Problems and Methods in Research & Education	CS-AMPRE Tuesday P.M.
CS-BSM	Mathematics and Computation in Biological Sciences and Medicine	CS-BSM #1 Monday A.M. CS-BSM #2 Monday A.M. CS-BSM #3 Tuesday A.M. CS-BSM #4 Tuesday A.M. CS-BSM #5 Wednesday A.M.
CS-CACO	Computational Algebra, Combinatorics and Optimization	CS-CACO Monday P.M.
CS-CPC	Computational Physics and Chemistry	CS-CPC Monday A.M.
CS-DSDE	Applications of Dynamical Systems and Differential Equations	CS-DSDE #1 Thursday P.M. CS-DSDE #2 Friday A.M.
CS-ENV	Mathematical Modelling in Environmental Sciences and Models for Complex Media	CS-ENV #1 Friday P.M. CS-ENV #2 Friday A.M.
CS-FINANCE	Financial Mathematics and Computation	CS-FINANCE #1 Friday A.M. CS-FINANCE #2 Friday P.M.
CS-MECHE	Computational Mechanics and Engineering	CS-MECHE #1 Monday P.M. CS-MECHE #2 Tuesday A.M. CS-MECHE #3 Tuesday P.M.
CS-MODELING	Partial Differential and Integral Equations in Mathematical Modeling	CS-MODELING #1 Wednesday A.M. CS-MODELING #2 Wednesday P.M. CS-MODELING #3 Thursday A.M. CS-MODELING #4 Thursday P.M. CS-MODELING #5 Friday A.M.
CS-POST	Poster Session	CS-POST #1-#2 Wednesday

12. High-Level Congress Schedule

Mon: A.M.=10:30-12:30; P.M.=3:30-5:30
 Tues-Fri: A.M.=10:00-12:00; P.M.=3:00-5:00


Room	LH1001	LH1009	LH1010	LH1011	LH2066	LH3094	LH3098	LH3101
August 21	PLENARY	SS-MSED	SS-OC DG	SS-RPNMSC	SS-GMCTA	SS-RAWP	CS-CPC	CS-BSM
	M. Wheeler	Modelling of Socio-economic Dynamics	Optimal Control and Differential Games	Recent Progress in Numerical Methods and Scientific Computing	Geometric Mechanics and Control: From Theory to Applications	Recent Advances in Mathematical and Computational Aspects of Wave Propagation	Computational Physics and Chemistry	Mathematics and Computation in Biological Sciences and Medicine
P.M.	B. Adcock (Prize Lecture)	CS-CACO					Computational Algebra, Combinatorics and Optimization	
August 22	A. Longtin	Computational Number Theory	SS-FCA	SS-GLS	SS-ASQE	CS-MODELING	SS-AAIP	SS-IM
	P.M.		A. Vespignani	Fractional Calculus and Applications	SS-DASO			
August 23	K. Ramanan	SS-FD	SS-DAG	SS-TAVI	SS-CC	Partial Differential Equations and Integral Equations in Mathematical Modeling	Applied Analysis and Inverse Problems	Industrial Mathematics
	P.M.		V. Conitzer	Dynamics and Games	Theory and Applications of Variational Inequalities			
August 24	F.E. Su	Fair Decisions	SS-MFMCR	SS-DETA	SS-DETA	Partial Differential Equations and Integral Equations in Mathematical Modeling	Applied Analysis and Inverse Problems	Industrial Mathematics
	P.M.		H. Stein					
August 25	W. Welch	SS-MMNN	CS-FINANCE	SS-NDSA	Delay Equations: Theory and Applications	Partial Differential Equations and Integral Equations in Mathematical Modeling	CS-ENV	CS-DSDE
	P.M.	I. Bahar	Mathematical Models for Nanoscience and Nanotechnology	Nonlinear Dynamical Systems and Applications	Delay Equations: Theory and Applications			
					 What's New in Maple 2017?			

Time	Room				
8:30-9:00	LH1001	AMMCS Congress Opening Deborah MacLatchy, Wilfrid Laurier University President Jeff Henry, Councillor, City of Waterloo			
9:00-10:00	LH1001	Congress Plenary Lecture <i>Adaptive Enriched Galerkin Methods for Miscible Displacement in Porous Media</i> Mary Wheeler , University of Texas at Austin, Abstract & Biography on p. 18 (Chair: R. Melnik, Wilfrid Laurier University)			
10:00-10:30	LH Halls	Coffee Break			
10:30-12:30	LH1009	LH1010	LH1011	LH2066	
	SS-MSED	SS-OCDG #1	SS-RPNMSC #1	SS-GMCTA #1	
	Modeling of Socio-economic Dynamics	Optimal Control and Differential Games	Recent Progress in Numerical Methods and Scientific Computing	Geometric Mechanics and Control: From Theory to Applications	
		LH3094	LH3098	LH3101	
	SS-RAWP #1	CS-CPC	CS-BSM #1		
	Recent Advances in Mathematical and Computational Aspects of Wave Propagation	Computational Physics and Chemistry	Mathematics and Computation in Biological Sciences and Medicine		
12:30-14:00	Lunch				
14:00-15:00	LH1001	Congress Kolmogorov-Wiener Prize Lecture for Young Researchers <i>Sparse Polynomial Approximation of High-Dimensional Functions</i> Ben Adcock , Simon Fraser University, Abstract & Biography on p. 21 (Chair: R. Makarov, Wilfrid Laurier University)			
15:00-15:30	LH Halls	Coffee Break			
15:30-17:30	LH1009	LH1010	LH1011	LH2066	
	CS-CACO	SS-OCDG #2	SS-RPNMSC #2	SS-GMCTA #2	
	Computational Algebra, Combinatorics and Optimization	Optimal Control and Differential Games	Recent Progress in Numerical Methods and Scientific Computing	Geometric Mechanics and Control: From Theory to Applications	
		LH3094	LH3098	LH3101	
	SS-RAWP #2	CS-MECHE #1	CS-BSM #2		
	Recent Advances in Mathematical and Computational Aspects of Wave Propagation	Computational Mechanics and Engineering	Mathematics and Computation in Biological Sciences and Medicine		

Time	Room				
8:30-9:30	LH1001	Congress Plenary Lecture <i>The Mathematical Limits of Sensory Integration and Control</i> André Longtin , University of Ottawa, Abstract & Biography on p. 12 (Chair: R. Melnik, Wilfrid Laurier University)			
9:30-10:00	LH Halls	Coffee Break			
10:00-12:00	LH1009	LH1010	LH1011	LH2066	
	SS-CNT #1	SS-FCA	SS-RPNMSC #3	SS-ASQE #1	
	Computational Number Theory	Fractional Calculus and Applications	Recent Progress in Numerical Methods and Scientific Computing	Analogue Signals In Quantum Environments: The Physics and Mathematics of Propagation and Control	
		LH3094	LH3098	LH3101	
	SS-RAWP #3	CS-MECHE #2	CS-BSM #3		
	Recent Advances in Mathematical and Computational Aspects of Wave Propagation	Computational Mechanics and Engineering	Mathematics and Computation in Biological Sciences and Medicine		
12:00-13:30		Lunch			
13:30-14:30	LH1001	Congress Plenary Lecture <i>Mathematical and Computational Modeling of Epidemics Does More Than Forecast</i> Alessandro Vespignani , Northeastern University, Abstract & Biography on p. 16 (Chair: H. Kunze, University of Guelph)			
14:30-15:00	LH Halls	Coffee Break			
15:00-17:00	LH1009	LH1010	LH1011	LH2066	
	SS-CNT #2	CS-APMRE	SS-GLS	SS-ASQE #2	
	Computational Number Theory	Applied Problems and Methods in Research & Education	Geocomputational Landscapes and Spaces	Analogue Signals In Quantum Environments: The Physics and Mathematics of Propagation and Control	
		LH3094	LH3098	LH3101	
	SS-RAWP #4	CS-MECHE #3	CS-BSM #4		
	Recent Advances in Mathematical and Computational Aspects of Wave Propagation	Computational Mechanics and Engineering	Mathematics and Computation in Biological Sciences and Medicine		

Time	Room				
8:30-9:30	LH1001	Congress Plenary Lecture <i>Scaling Limits of Stochastic Networks</i> Kavita Ramanan , Brown University, Abstract & Biography on p. 13 (Chair: R. Makarov, Wilfrid Laurier University)			
9:30-10:00	LH Halls	Coffee Break & Poster Session			
10:00-12:00	LH1009	LH1010	LH1011	LH2066	
	SS-CNT #3	SS-DAG #1	SS-DASO #1	SS-CDAHS #1	
	Computational Number Theory	Dynamics and Games	Data Analysis for System Optimization	Complex Data Analysis in Health Science	
		LH3094	LH3098	LH3101	
	CS-MODELING #1	SS-AAIP #1	CS-BSM #5		
	Partial Differential and Integral Equations in Mathematical Modeling	Applied Analysis and Inverse Problems	Mathematics and Computation in Biological Sciences and Medicine		
12:00-13:30		Lunch			
13:30-14:30	LH1001	Congress Plenary Lecture <i>Moral Artificial Intelligence and the Societal Tradeoffs Problem</i> Vincent Conitzer , Duke University, Abstract & Biography on p. 11 (Chair: M. Kilgour, Wilfrid Laurier University)			
14:30-15:00	LH Halls	Coffee Break & Poster Session			
15:00-17:00	LH1009	LH1010	LH1011	LH2066	
	SS-CNT #4	SS-DAG #2	SS-DASO #2	SS-CDAHS #2	
	Computational Number Theory	Dynamics and Games	Data Analysis for System Optimization	Complex Data Analysis in Health Science	
		LH3094	LH3098	LH3101	
	CS-MODELING #2	SS-AAIP #2	SS-IM #1		
	Partial Differential and Integral Equations in Mathematical Modeling	Applied Analysis and Inverse Problems	Industrial Mathematics		

Time	Room				
8:30-9:30	LH1001	Congress Plenary Lecture <i>A Polytopal Generalization of Sperner's Lemma</i> Francis Edward Su , Harvey Mudd College, Abstract & Biography on p. 15 (Chair: M. Kilgour, Wilfrid Laurier University)			
9:30-10:00	LH Halls	Coffee Break			
10:00-12:00	LH1009	LH1010	LH1011	LH2066	
	SS-FD #1 Fair Decisions	SS-MFMCR #1 Mathematical Finance: Modeling, Computation and Risk Management	SS-TAVI #1 Theory and Applications of Variational Inequalities	SS-CC Computational Chemistry	
		LH3094	LH3098	LH3101	
		CS-MODELING #3 Partial Differential and Integral Equations in Mathematical Modeling	SS-AAIP #3 Applied Analysis and Inverse Problems	SS-IM #2 Industrial Mathematics	
12:00-13:30		Conference Photo Shoot at 12:00 & Lunch			
13:30-14:30	LH1001	Congress Plenary Lecture <i>Big Data's Dirty Secret</i> Harvey Stein , Bloomberg LP and Columbia University, Abstract & Biography on p. 14 (Chair: J. Campolieti, Wilfrid Laurier University)			
14:30-15:00	LH Halls	Coffee Break			
15:00-17:00	LH1009	LH1010	LH1011	LH2066	
	SS-FD #2 Fair Decisions	SS-MFMCR #2 Mathematical Finance: Modeling, Computation and Risk Management	SS-TAVI #2 Theory and Applications of Variational Inequalities	SS-DETA #1 Delay Equations: Theory and Application	
		LH3094	LH3098	LH3101	
		CS-MODELING #4 Partial Differential and Integral Equations in Mathematical Modeling	CS-ENV #1 Mathematical Modeling in Environmental Sciences and Models of Complex Media	CS-DSDE #1 Applications of Dynamical Systems and Differential Equations	
18:30-22:00	Waterloo Delta Hotel	Congress Banquet Dinner			

Time	Room				
8:30-9:30	LH1001	Congress Plenary Lecture			
		<i>Gaussian Processes and the Statistical Analysis of Computer Experiments</i> William Welch , University of British Columbia, Abstract & Biography on p. 17 (Chair: X. Wang, Wilfrid Laurier University)			
9:30-10:00	LH Halls	Coffee Break			
10:00-12:00	LH1009	LH1010	LH1011	LH2066	
	SS-MMNN #1	CS-FINANCE #1	SS-NDSA #1	SS-DETA #2	
	Mathematical Models for Nanoscience and Nanotechnology	Financial Mathematics and Computation	Nonlinear Dynamical Systems and Applications	Delay Equations: Theory and Application	
		LH3094	LH3098	LH3101	
	CS-MODELING #5	CS-ENV #2	SS-DSDE #2		
	Partial Differential and Integral Equations in Mathematical Modeling	Mathematical Modeling in Environmental Sciences and Models of Complex Media	Applications of Dynamical Systems and Differential Equations		
12:00-13:30		Lunch			
13:30-14:30	LH1001	Congress Plenary Lecture			
		<i>Learning from Elastic Network Models: From Proteins to Chromatin Dynamics</i> Ivet Bahar , University of Pittsburgh, Abstract & Biography on p. 10 (Chair: H. Kunze, University of Guelph)			
14:30-15:00	LH Halls	Coffee Break			
15:00-16:20	LH1009	LH1010	LH1011	LH2066	
	SS-MMNN #2	CS-FINANCE #2	SS-NDSA #2	What's New in Maple 2017?	
	Mathematical Models for Nanoscience and Nanotechnology	Financial Mathematics and Computation	Nonlinear Dynamical Systems and Applications		
		LH3094	LH3098	LH3101	
16:30-17:00	LH1001	Congress Prize Announcements & Closing			

13. Parallel Sessions Schedule

The following pages give the detailed speaker list for the morning and afternoon parallel session each day of the Congress.

Monday, August 21

Monday, August 21: Morning

Time	Room	LH1010	LH1011	LH2066
	LH1009	LH1010	LH1011	LH2066
	SS-MSED	SS-OCDG #1	SS-RPNMSC #1	SS-GMCTA #1
	Modeling of Socio-economic Dynamics Chairs: B. Düring & E. Scalas University of Sussex	Optimal Control and Differential Games Chair: P. Wolenski Louisiana State University	Recent Progress in Numerical Methods and Scientific Computing Chair: D. Liang York University	Geometric Mechanics and Control: From Theory to Applications Chair: M. Santoprete Wilfrid Laurier University
10:30-10:50	<i>Statistical Equilibria in A Discrete Choice Model of Financial Markets</i> T. Kaizoji International Christian University Tokyo	<i>Optimal Control of Systems with Evolving Dynamics</i> Y. LedyaeV Western Michigan University	<i>Error Expansion for a Symplectic Scheme for Stochastic Hamiltonian Systems</i> C. Anton MacEwan University	<i>A variational Lagrangian formulation for nonequilibrium thermodynamics</i> F. Gay-Balmaz Ecole Normale Supérieure de Paris
10:50-11:10	<i>Kinetic Models of Conservative Economies with Welfare Thresholds</i> K. Kayser Arizona State University	<i>An Optimal Control Approach to Structured Treatment Interruptions for HIV Patients</i> H. Tran North Carolina State University	<i>A Wavelet Based Phase-field Simulation of Two-phase Flows in Porous Media</i> J. Alam Memorial University of Newfoundland	<i>Self-Propulsion of Mobile Robots with Underactuated Internal Dynamics</i> S. Kelly University of North Carolina at Charlotte
11:10-11:30	<i>Stylised Models for the Distribution of Wealth</i> E. Scalas University of Sussex	<i>Growth Model for Tree Stems and Vines</i> M. Palladino Penn State University	<i>A Fourth-order Compact Numerical Scheme for Three-dimensional Acoustic Wave Equation with Variable Velocity</i> W. Liao University of Calgary	<i>On the Hamiltonian Equations for the Coupled System of a Free Surface and a Rigid Body</i> B. Shashikanth New Mexico State University
11:30-11:50	<i>An Age-structured Continuum Model for Myxobacteria</i> A. Manhart New York University	<i>Time-optimal Control Problems in the Space of Probability Measures and the Superposition Principle</i> G. Cavagnari Rutgers-The State University of New Jersey	<i>Time Second-Order Mass-Preserving Characteristic Schemes and Application to Atmospheric Environmental Computations</i> K. Fu Ocean University of China	<i>Exact Geometric Approach to the Discretization of Fluid-structure Interactions</i> V. Putkaradze University of Alberta
11:50-12:10	<i>Mean-field Control Hierarchy in Consensus Modeling</i> G. Albi University of Verona	<i>A Dynamic Model of the Limit Order Book</i> H. Wei Penn State University	<i>Comparative Study on Numerical Solutions of Partial Differential Equations</i> T.S. Thind S.G.T.B Institute of Management & IT	
12:10-12:30	<i>Inhomogeneous Boltzmann-Type Equations Modelling Opinion Leadership and Political Segregation</i> B. Düring University of Sussex	<i>Vanishing Viscosity Limit for a System of H-J Equations Related to a Debt Management Problem</i> Y. Jiang Penn State University	<i>Numerical Linear Algebra Approach to Cell Image Segmentation</i> J. Wan University of Waterloo	
12:30-12:50	<i>Macroeconomic modelling with heterogeneous agents: the master equation approach</i> P. Li McMaster University			

Monday, August 21: Afternoon

Time	Room	LH1010	LH1011	LH2066
	LH1009	LH1010	LH1011	LH2066
	CS-CACO	SS-OC DG #2	SS-RPNMSC #2	SS-GMCTA #2
	Computational Algebra, Combinatorics and Optimization Chair: M. Demers University of Guelph	Optimal Control and Differential Games Chair: Y. Ledyaev Western Michigan University	Recent Progress in Numerical Methods and Scientific Computing Chair: R. Corless University of Western Ontario	Geometric Mechanics and Control: From Theory to Applications Chair: V. Putkaradze University of Alberta
15:30-15:50	<i>Investigating Optimization Parameters for an Evolutionary Algorithm</i> N. Ismail University of Guelph	<i>Optimal Control in Poro-Visco-Elastic Models</i> L. Bociu North Carolina State University	<i>Pruning the Search Trees for Finding the Minkowski Reduced Lattice Bases</i> S. Qiao McMaster University	<i>Abstract Numerical Analysis</i> G. Patrick University of Saskatchewan
15:50-16:10	<i>Exact Coloring of Sparse Matrices</i> A.I. Khan University of Lethbridge	<i>Optimal Control of Breast Cancer : Investigating Estrogen as a Risk Factor</i> S. Oke University of Zululand	<i>Techniques of Fast Multipole Method (FMM) for Vortex Method Calculation</i> T. Sheel Memorial University of Newfoundland	<i>Motion in a Symmetric Potential on the Hyperbolic Plane</i> M. Santoprete Wilfrid Laurier University
16:10-16:30	<i>Topological Indices on Different Networks</i> F. Haq COMSATS Institute of IT	<i>Induced Optimization for PDE Constrained Optimal Control Problems with Linearly Appearing Control Variable</i> G. Vossen Niederrhein University of Applied Sciences	<i>A Robust Numerical Method for the Maxwell Equations with Random Interfaces</i> K. (Kai) Zhang Jilin University	<i>Dynamics of Solar Sailing</i> A. Kuppa Wilfrid Laurier University
16:30-16:50	<i>Authentication Protocol via Zero Knowledge Proof Based on α-Skew π-Armendariz Rings</i> A.M.A. Al-Alwash University of Technology, Iraq	<i>Conservation Laws and Some Applications to Traffic Flows</i> T.K. Nguyen North Carolina State University	<i>Fast Solvers for Models of Incompressible Flow, Linear Elasticity and Poroelasticity and Their Applications in Biomechanics</i> M. Cai Morgan State University	<i>Separation of Variables on Spaces of Constant Curvature</i> C. Valero University of Waterloo
16:50-17:10	<i>Unitary Operator Decompositions Applied to Quantum Circuits</i> T. Goubault de Brugière Laboratoire de Recherche en Informatique, Orsay	<i>Mathematical Modelling for The Design of An Intelligent Dynamic System</i> M. El-Arabaty Misr International University	<i>Regularisation Based Time Adaptive Numerical Solution of a Highly Nonlinear Multi Species Biofilm Model with Cross-diffusion</i> M. Ghasemi University of Guelph	
17:10-17:30		<i>Application of Euler's Method for the Solution of Optimal Control Problems</i> T.E. Olaosebikan Ekiti State University	<i>Energy Law and Metamaterial Electromagnetic Computation</i> D. Liang York University	

Monday, August 21: Afternoon

Time	Room	LH3098	LH3101
	LH3094	LH3098	LH3101
	SS-RAWP #2	CS-MECHE #1	CS-BSM #2
	Recent Advances in Mathematical and Computational Aspects of Wave Propagation Chair: E. Kirr University of Illinois at Urbana-Champaign	Computational Mechanics and Engineering Chair: H. Kunze University of Guelph	Mathematics and Computation in Biological Sciences and Medicine Chair: M. Soltani K.N. Toosi University of Technology
15:30-15:50	<i>New Source Models for Radiation from Thin Wire Antennas</i> M. Haslam York University	<i>A High Accurate Algorithm for Diffusion Equations on Distorted Meshes</i> S. Song Institute of Applied Physics and Computational Mathematics, Beijing	<i>Degenerate, Diffusion Reaction Based Biofilm Growth Model on Non-orthogonal Grids</i> M.A. Ali University of Guelph
15:50-16:10	<i>Field Control Through Manipulation of Surface Sources</i> D. Onofrei University of Houston	<i>Dependence of Turbulent RayleighTaylor Mixing on the Complex Initial Perturbation</i> Y. Zhang Institute of Applied Physics and Computational Mathematics, Beijing	<i>Population Dynamics of Phages and Biofilm Bacteria</i> A. Khan University of Western Ontario
16:10-16:30	<i>Radiative Transfer Theory for Luminescent Solar Concentrators and Solar Cells</i> B. Ilan University of California, Merced	<i>Genetic Algorithm Optimization for Deriving Compact Thermal Models</i> O. Daniel Thales Corporate Engineering, Velizy-Villacoublay	<i>A Metapopulation Model Incorporating Geographic Mobility Process</i> M. Althubiani York University
16:30-16:50	<i>Quantum Kinetic vs. Weak Turbulence</i> M.B. Tran University of Wisconsin	<i>Performance, Thermal Stability and Optimum Design Analyses of Rectangular Fin with Temperature-dependent Thermal Properties and Internal Heat Generation</i> G. Sobamowo University of Lagos	<i>Spatially-implicit Modelling of Disease-behavior Interactions in the Context of Non-pharmaceutical Interventions</i> N. Ringa Botswana International University of Science and Technology
16:50-17:10	<i>Global Existence of Weak Solutions for the Burgers-Hilbert Equation</i> T.K. Nguyen North Carolina State University	<i>The Effects of Thermal Radiation on a Reactive Hydromagnetic Internal Heat Generating Fluid Flow Through Parallel Porous Plates</i> A. Hassan University of South Africa	<i>First Order Systems with Functional Boundary Conditions and Their Role in Applications to Medicine</i> J. Fialho American University of the Middle East, Kuwait
17:10-17:30	<i>Field Patterns in Space-time Microstructures</i> O. Mattei University of Utah		<i>Conformational Change of C6M1 Peptide in the Presence of Salt and Lipid: Molecular Modeling and Experimental Validation</i> M. Soltani K.N. Toosi University of Technology
17:30-17:50	<i>The Influence of the Initial Bore Shape of a Trumpet is Numerically Studied in 3D Using the the Discontinuous Galerkin Method</i> J. Resch University of Waterloo		

Tuesday, August 22

Tuesday, August 22: Morning

Time	Room			
	LH1009	LH1010	LH1011	LH2066
	SS-CNT #1	SS-FCA	SS-RPNMSC #3	SS-ASQE #1
	Computational Number Theory Chair: C. Weatherby Wilfrid Laurier University	Fractional Calculus and Applications Chair: E. Scalas University of Sussex	Recent Progress in Numerical Methods and Scientific Computing Chair: J. Wan University of Waterloo	Analogue Signals In Quantum Environments: The Physics and Mathematics of Propagation and Control Chair: P. Navez & A. Zagoskin University of Crete & Loughborough University
10:00-10:20	<i>Numerical Tests of Two Conjectures in Fake Real Quadratic Orders</i> R. Scheidler University of Calgary	<i>Stability and Convergence of Difference Schemes with Higher Order of Approximation for Fractional Diffusion Equation</i> A. Alichanov Institute of Applied Mathematics and Automation of Kabardin-Balkar Scientific Center of RAS	<i>Higher Order Space-time Hybridizable and Embedded Discontinuous Galerkin Methods for Incompressible Flows</i> T. Horvath University of Waterloo	<i>Pechukas-Yukawa Formalism for the Description of Quantum Coherent Structures</i> A. Zagoskin Loughborough University
10:20-10:40	<i>Multiquadratic Fields of Class Number 2^k</i> A. Feaver The King's University	<i>A Novel Approach to the Discretisation of Space-fractional Differential Equations on Bounded Domains</i> N. Cusimano Basque Center for Applied Mathematics	<i>Numerical Methods for Optimal Mass Transport Image Registration</i> Y. (Yangang) Chen University of Waterloo	<i>Quantum Transport in a Superlattice Driven by a High-frequency Acoustic Wave</i> A. Balanov Loughborough University
10:40-11:00	<i>Counting Elliptic Curves with Prescribed Torsion over Finite Fields</i> J. Park University of Michigan	<i>Mixing Times and Relaxation to Equilibrium for Fractional Time-changed Semi-Markov Processes</i> N. Georgiou University of Waterloo	<i>Modeling the Eddy Currents Induced by the X,Y,Z-Gradient Coils in the MRI Scanner Using the 3D EC-S-FDTD Scheme</i> S. Sriskandarajah York University	<i>Quantum Zeno Dynamics of Qubits in a Squeezed Reservoir: Effect of Measurement Selectivity</i> A. Maasen van den Brink National Taiwan University
11:00-11:20	<i>Elliptic Nets and Denominator Nets</i> S. Yazdani Google Canada	<i>The Fractional Non-homogeneous Poisson Process</i> M. Trinh University of Sussex	<i>Convergence of Approximation Schemes for Weakly Nonlocal Second Order Equations</i> P. Azimzadeh University of Waterloo	<i>Expansion in Large Coordination Number for Quantum Lattice Systems</i> P. Navez University of Crete
11:20-11:40	<i>Effective Results on Unlikely Intersections of Dynamical Systems</i> P. Fili Oklahoma State University	<i>Pseudo-differential Relaxation Equations and Semi-Markov Processes</i> E. Scalas University of Sussex	<i>A New Kind of Companion Matrix</i> E. Chan University of Western Ontario	<i>Mean Field Adiabatic Quantum Computation</i> P. Navez University of Crete
11:40-12:00	<i>Solving the S-unit equation in Sage</i> B. Malmskog Villanova University	<i>A Second Order Accurate Numerical Approximation for Time-Space Fractional Diffusion Equation</i> S. Arshad Chinese Academy of Sciences	<i>Simulating a Mechanical System directly from a Cartesian Coordinate Lagrangian</i> J.D. Pryce McMaster University	

Tuesday, August 22: Morning

Time	Room		
	LH3094	LH3098	LH3101
	SS-RAWP #3	CS-MECHE #2	CS-BSM #3
	Recent Advances in Mathematical and Computational Aspects of Wave Propagation Chair: E. Kirr University of Illinois at Urbana-Champaign	Computational Mechanics and Engineering Chair: L. Ma Energy, Mining and Environment Portfolio National Research Council Canada	Mathematics and Computation in Biological Sciences and Medicine Chair: K. Levere University of Guelph
10:00-10:20	<i>Estimates for Spectral Multipliers</i> M. Beceanu University of Albany, SUNY	<i>Hardness Prediction of Particle-reinforced Metal Matrix Composite Materials</i> L. Ma Energy, Mining and Environment Portfolio National Research Council Canada	<i>A Model of Highly Pathogenic Avian Influenza in Broilers with Environmental Reservoir and Vaccine Intervention Over Finite Time</i> M. Coffey University of Guelph
10:20-10:40	<i>The Nonlinear Schrödinger Equation on Large Domains</i> Z. Hani Georgia Institute of Technology	<i>Turbulence Generated by 3D Sparse Multi-Scale Grid</i> N. Malik King Fahd University of Petroleum and Minerals	<i>Modeling the spread of Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia</i> D. He Hong Kong Polytechnic University
10:40-11:00	<i>Fermi's Golden Rule and H^1 Scattering for Nonlinear Klein-Gordon Equations with Metastable States</i> X. An University of Toronto	<i>Optimization of flanged DAWTs using a CFD Actuator Disc Method</i> K. Gharali University of Tehran	<i>Model Predictive Control of an HBV Model Based on a Nonlinear Kalman Filter</i> H-D. Kwon Inha University
11:00-11:20	<i>Random Data Cauchy Theory for Power Type Nonlinear Wave Equations on \mathbb{R}^d</i> D. Mendelson University of Chicago	<i>Asymptotic Expansions for High-Contrast Linear Elasticity Problems</i> L. Poveda Universidade de São Paulo	<i>Communication Between Viruses Influences Virulence Decisions</i> T. Pattenden University of Western Ontario
11:20-11:40	<i>Asymptotic Stability in the Variable-speed ϕ^4 Model: Odd Perturbations</i> S. Snelson University of Chicago		<i>Modelling Fitness Evolution of HIV-1 Including the Impact of Both Viral Replication and Transmission.</i> D. Dick University of Western Ontario
11:40-12:00	<i>Linear stability of the catenoid under the VMC flow outside of symmetry</i> W. Wong Université Pierre et Marie Curie		<i>Wavelet Coefficient Based Fuzzy Inference System for Diagnosis of Malaria</i> P. Pandit The Maharaja Sayajirao University of Baroda

Tuesday, August 22: Afternoon

Time	Room	LH1010	LH1011	LH2066	
	LH1009 SS-CNT #2	LH1010 CS-APMRE	LH1011 SS-GLS	LH2066 SS-ASQE #2	
	Computational Number Theory Chair: P. Ingram York University	Applied Problems and Methods in Research & Education Chair: S. Verma & A.L. Yadav & H. Shodiev Shri G.S. Institute of Technology and Science & Wilfrid Laurier University	Geocomputational Landscapes and Spaces Chair: S.A. Roberts Wilfrid Laurier University	Analogue Signals In Quantum Environments: The Physics and Mathematics of Propagation and Control Chair: B-Z. Li & A. Sowa Beijing Institute of Technology & University of Saskatchewan	
15:00-15:20	Semi-plenary Lecture <i>Computing Zeta Functions in Average Polynomial Time</i>	<i>Feature and Outlier Detection in Magnetograms</i> M. Weygang Trent University	<i>Distributed Snow Simulations for Quantification of Snow Accumulation Across an Arctic Shrub-tundra Landscape</i> A. Toure Wilfrid Laurier University	<i>Time Dependent Real-space Renormalisation Group Treatment of the Random Transverse-Field Ising Model</i> P. Mason Loughborough University	
15:20-15:40		<i>Asymptotic Properties of Number of Observations in Random Regions of Records</i> J. Ahmadi Ferdowsi University of Mashhad	<i>Determining Lichen Volume in the Bathurst Caribou Winter Range Using High Resolution UAV and Landsat Imagery</i> N. Wilson Wilfrid Laurier University	<i>A Nonlinear-master-equation Model for Quantum Metamaterials</i> A. Sowa University of Saskatchewan	
15:40-16:00		<i>A Time Domain Scheduler for LTE Network and its Performance Evaluation</i> A. Yadav Shri G.S. Institute of Technology and Science, India	<i>Spectral-temporal Modeling of Bamboo-dominated Forest Succession in the Atlantic Forest of Southern Brazil</i> C. Grieg Wilfrid Laurier University	<i>Numerical Methods for Analysis and Representation of Quantum States Associated with Integral Transform</i> B-Z. Li Beijing Institute of Technology	
16:00-16:20		<i>Improved Divisor Arithmetic for Low-Genus Hyperelliptic Curves</i> M. Jacobson University of Calgary	<i>Applying Data Envelopment Analysis Approach for Measuring Technical Efficiency</i> S. Verma S.G.S. Institute of Technology and Science, India	<i>Using High-frequency Coastal Radars for Calibration of AIS Based Ocean Vessel Tracking Models</i> B. Friedrich Wilfrid Laurier University	<i>Image Denoising via Redundant Quantum Channels</i> A. Melli University of Saskatchewan
16:20-16:40		<i>Using Magma to Study Origami Division Polynomials</i> R. Davis University of Wisconsin-Madison	<i>Using Social Media to Improve Knowledge Sharing among Healthcare Practitioners</i> H. Alali Amman Arab University	<i>The Prevalence and Use of Relative Spatial Expressions to Denote Location by Online News Articles</i> H. Lawrence University of Waterloo	<i>Examples of Quantum-dynamical Nonlaws and Their Properties</i> Q. Guo University of Saskatchewan
16:40-17:00	<i>The Dimensions of p-rank Strata for Cyclic Cubic Curves</i> C. Weir The Tutte Institute for Mathematics and Computer Science		<i>Alternative Spatial Foundations for GISci</i> S.A. Roberts Wilfrid Laurier University		

Tuesday, August 22: Afternoon

Time	Room	LH3098	LH3101
	LH3094	LH3098	LH3101
	SS-RAWP #4	CS-MECHE #3	CS-BSM #4
	Recent Advances in Mathematical and Computational Aspects of Wave Propagation Chair: N. Tarfulea Purdue University Northwest	Computational Mechanics and Engineering Chair: Y. Jia Institute of Applied Physics and Computational Mathematics, Beijing	Mathematics and Computation in Biological Sciences and Medicine Chair: K. Sakata Maebashi Institute of Technology (MAEBIT)
15:00-15:20	<i>Travelling Waves of a Highly Nonlinear Fourth-order Wave Equation</i> S. Anco Brock University	<i>A Full Waves Structure Riemann Solver and Second-order Cell-Centered Lagrangian Method for Two-dimensional Elastic-Plastic Flows</i> Y. Jia Institute of Applied Physics and Computational Mathematics, Beijing	<i>Comparing the Avian and Mammalian Brain Through Neural Networking</i> N. Wilkins Rochester Institute of Technology
15:20-15:40	<i>Bifurcations of Relative Periodic Orbits in NLS/GP with a Three-well Potential</i> R. Goodman New Jersey Institute of Technology	<i>The Wave Scattering Analysis of Flexible Trifurcated Waveguide Using Mode-Matching Approach</i> R. Nawaz COMSATS Institute of Information Technology Islamabad-Pakistan	<i>The Recurrence-Based Approach for Brain Data Analysis</i> M. Rabbani University of Western Ontario
15:40-16:00	<i>Nonlinear Waves in Nonlinear Schrödinger (NLS) Systems</i> E. Charalampidis University of Massachusetts Amherst	<i>A Computational Model for Adjusting Surface Tension Coefficient in Pseudo-potential Lattice Boltzmann Method</i> M. Ashrafzaadeh Isfahan University of Technology	<i>Cybernetic Modeling of Growth Dynamics of <i>Debaryomyces nepalensis</i> NCYC 3413 and Xylitol Production in Batch Reactor</i> S.M. Pappu J Indian Institute of Technology Madras
16:00-16:20	<i>A Compact Alternative Directional Implicit Method for Solving Two-dimensional Fractional Acoustic Wave Equation</i> W. Liao University of Calgary	<i>MHD Flow in a Rectangular Duct</i> C. Bozkaya Middle East Technical University	<i>Information Transfer-Model Interprets Loss of Control Capability in Biological Systems under External Stimuli</i> K. Sakata Maebashi Institute of Technology (MAEBIT)
16:20-16:40	<i>On Gravitational Collapse in General Relativity</i> X. An University of Toronto	<i>On the Use of Lattice Boltzmann Method for Simulating Peristaltic Transport of a Single Solid Ellipsoidal Particle Suspended in a Newtonian Fluid</i> K. Gharali University of Tehran	<i>On the validity of a perturbation flow solution for mass transport calculations in 2D biofilm simulations</i> R. Sudarsen University of Guelph
16:40-17:00	<i>Spectral Stability of Solitary Traveling Waves in Hamiltonian Lattices and an Energy Criterion</i> H. Xu Institute for Mathematics and its Applications, University of Minnesota		
17:00-17:20	<i>An L-infinity Preserving Slope Limiter for the Discontinuous Galerkin Method on Unstructured Triangular Meshes</i> A. Giuliani University of Waterloo		

Wednesday, August 23

Wednesday, August 23: Posters

Time	Room		
	LH Hallways CS-POST #1-2 Poster Session		
9:30-10:00 & 14:30-15:00	<p><i>Modeling and Simulation of Phenol Degradation in a Cascade Photoreactor</i></p> <p>N.M. Baena López Universidad Autónoma Metropolitana Azcapotzalco</p>	<p><i>A New Similarity Method for Searching Organic Chemical Structures</i></p> <p>J. Huang York University</p>	<p><i>Fractional Order Total Variation Based Model for Multiplicative Noise Removal</i></p> <p>R. Rizwan University of Peshawar</p>
	<p><i>Quantum Mechanical Free Energy Profile of the Water Dimer Over a Broad Range of Temperatures</i></p> <p>K.P. Bishop University of Waterloo</p>	<p><i>Spatial Correlation as an Early Warning Signal of a Critical Transition in a Multiplex Disease-Behaviour Network</i></p> <p>P. Jentsch University of Waterloo</p>	<p><i>Mathematical Kinematic Modelling of a New 3DOF Micro-CMM Parallel Manipulator</i></p> <p>A. Rugbani Cape Peninsula University of Technology, South Africa</p>
	<p><i>Exact Solutions of the Equations of Motion of a System of Two Coupled Lagrange Tops in a Central Gravitational Field</i></p> <p>D. Chebanov City University of New York</p>	<p><i>Convergence of the Regularized Sinc Collocation Method Applied to Fredholm Integral Equation</i></p> <p>B. Nadjib University 8 Mai 1945</p>	<p><i>Numerical Simulation of Ultrasound-Driven Bubble Motion on a Wall</i></p> <p>G. Son Sogang University</p>
	<p><i>Numerical Simulation of Tracer Tests in Porous Media Based on a Green's Functions Formulation</i></p> <p>M.M. Gonzalez-Brambila Universidad Autónoma Metropolitana Azcapotzalco</p>	<p><i>A New Discrete Model for the Simulation of a Non-linear Differential Equation Arising From the Dynamics of the Tsunami Tidal Waves</i></p> <p>A. Obayomi Ekiti State University</p>	<p><i>A Model for the Prediction of the Growth and Activity of a Lung Tumor</i></p> <p>I. Telitel Université des Frères Mentouri Constantine</p>

Wednesday, August 23: Morning

Time	Room			
	LH1009	LH1010	LH1011	LH2066
	SS-CNT #3	SS-DAG #1	SS-DASO #1	SS-CDAHS #1
	Computational Number Theory Chair: P. Ingram York University	Dynamics and Games Chair: M. Santoprete Wilfrid Laurier University	Data Analysis for System Optimization Chair: W. Feng Trent University	Complex Data Analysis in Health Science Chair: G. Heo University of Alberta
10:00-10:20	<i>Effective Sato-Tate under GRH</i> A. Bucur University of California, San Diego	<i>Dynamic Equilibria in Decentralized Economies with Fiat Money</i> F. Bonetto Georgia Institute of Technology	<i>Modeling Within Host Dynamics of L. Monocytogenes and Understanding the Dose-response Relationship</i> A. Rahman York University	<i>Inferring Direct Genetic Effects in Directed Acyclic Graphs Using Estimating Equations</i> Y. Yilmaz Memorial University of Newfoundland
10:20-10:40	<i>Some Modular Calabi-Yau Fivefolds</i> A. Logan Government of Canada	<i>Interaction Times Change Evolutionary Outcomes</i> R. Cressman Wilfrid Laurier University	<i>Population-Level Ambient Pollution Exposure Proxies</i> C. Scott Trent University	<i>Regression-based Mixture Models for Microbiome Data</i> S. Dang Binghamton University
10:40-11:00	<i>Computing Elliptic Curves over the Rationals</i> A. Gherga University of British Columbia	<i>New Approach for Modelling of Large Scale Engineering Systems</i> M. El-Arabaty Misr International University	<i>Comparison and Analysis of Classification Algorithms for Traditional Chinese</i> H. Hu Brock University	<i>A New Constrained Mixture Models for Drug Discovery Data</i> X. (Xu) Wang Wilfrid Laurier University
11:00-11:20	<i>On the Arithmetic of a Family of Degree-two Diagonal K3 Surfaces</i> M. West Kalamazoo College	<i>The Optimal Control of Axelrods Social Norms Game</i> A. Jaber University of Guelph	<i>Simultaneous Optimization of Angles and Intensities in IMRT Using a New Metaheuristic</i> M. Mahootchi Amirkabir University of Technology	
11:20-11:40	<i>Infinite Products Involving Binary Digit Sums</i> S. Riasat University of Waterloo	<i>Population Dynamics and Evolutionary Games</i> V. Krivan Biology Centre CAS	<i>Multi-Channel Siamese LSTM for Semantic Similarity Classification</i> J. Ge The Education University of Hong Kong	
11:40-12:00	<i>On (a, b) Pairs in Random Fibonacci Sequences</i> J.C. Saunders University of Waterloo	<i>Strategic Decisions for Networks of Firms and Buyers</i> A. Pinto University of Porto	<i>Finding Random Delay in Transit Schedule Padding</i> S. Faisal Trent University	

Wednesday, August 23: Morning

Time	Room	LH3098	LH3101
	LH3094	LH3098	LH3101
	CS-MODELING #1	SS-AAIP #1	CS-BSM #5
	Partial Differential and Integral Equations in Mathematical Modeling Chair: M. Narita University	Applied Analysis and Inverse Problems Chair: H. Kunze University of Guelph	Mathematics and Computation in Biological Sciences and Medicine Chair: S. Subbey Institute of Marine Research, Norway
10:00-10:20	<i>Rogue Waves in the Generalized Davey-Stewartson System</i> I. Hacinliyan Istanbul Technical University	<i>Solving Inverse Problems on a Perforated Domain via the Collage Method for Vector-valued Lax-Milgram Variational Problems</i> H. Kunze University of Guelph	<i>A Novel Closed-Form Next Generation Operator for Reaction-Diffusion Systems and A Natural Environment For Modeling Movement</i> M. Betti University of Western Ontario
10:20-10:40	<i>Analytic Investigation of Fingero Imbibition Phenomena in Porous Media</i> S. Pathak Sardar Vallabhai National Institute of Technology	<i>Image-Driven Boundary Value Inverse Problems</i> V. Brott University of Guelph	<i>Application of Reinforcement Learning in Swarming Problems</i> N. Wilkins Rochester Institute of Technology
10:40-11:00	<i>Self-Similar Solutions for a Degenerate Parabolic System Not in Divergence Form</i> A. Matyakubov National University of Uzbekistan	<i>Solving Inverse Problems for Fractional ODEs via the Collage Theorem</i> K. Levere University of Guelph	<i>Estimating Parameters for an Ordinary-Differential-Equation Model Using a Neighborhood Approximation Algorithm</i> S. Subbey Institute of Marine Research, Norway
11:00-11:20	<i>Spreading of Near-shore Effluent Discharges on Eroded Sloping Sandy Beaches</i> A. Purnama Sultan Qaboos University, Oman	<i>Computational Resolution of the Inverse Problem of Kinetic Capillary Electrophoresis (KCE) to Arbitrary Accuracy</i> J. Vass York University	<i>An Adaptive Magnus Expansion Method for Solving the Chemical Master Equation</i> K. Dinh University of Alabama
11:20-11:40	<i>On Global Properties of Gowdy Spacetimes in Scalar-tensor Theory</i> M. Narita National Institute of Technology, Okinawa College	<i>Investigation of Mannheimia Haemolytica and Bovine Respiratory Disease to-wards generalized Immune Response through Mathematical Modelling</i> M. Griffiths University of Guelph	<i>Predictability of Marine Population Trajectories under the Effect of Birth and Harvest Pulses</i> A-S.J. Frank University of Oslo
11:40-12:00		<i>Dynamic Analysis and Optimal Control in a Coupled Environment-Growth Model</i> D. La Torre Nazarbayev University & University of Milan	

Wednesday, August 23: Afternoon

Time	Room			
	LH1009	LH1010	LH1011	LH2066
	SS-CNT #4	SS-DAG #2	SS-DASO #2	SS-CDAHS #2
	Computational Number Theory Chair: C. Weatherby Wilfrid Laurier University	Dynamics and Games Chair: A. Pinto University of Porto	Data Analysis for System Optimization Chair: W. Feng Trent University	Complex Data Analysis in Health Science Chair: S. Wang Wilfrid Laurier University
15:00-15:20	<i>Efficient Compression of SIDH Public Keys</i> D. Urbanik University of Waterloo	<i>Influence of Social Behaviour on the Evolution of Virulence</i> J. Pharaon University of Waterloo	<i>Our Greatest Weapon Against ISIS, Deep Learning</i> D. Fichuk Trent University	<i>Comparing Clostridium Difficile Infected Patients Before and After a Treatment Using Loops in DNA Sequences</i> G. Heo University of Alberta
15:20-15:40	<i>On p-adic Approximations of Algebraic Numbers and Their Conjugates</i> A. Mosunov University of Waterloo	<i>Mathematical Models of Radicalization</i> M. Santoprete Wilfrid Laurier University	<i>Searching Educational Resources with Ontology-based Query Expansion</i> J. Ge York University	<i>Statistical Inferences on Average Precision and ROC Curves</i> W. Su MacEwan Unive
15:40-16:00	<i>Explicit Computations with the Moduli Space of Abelian Surfaces with a Level 3 Structure</i> B. Nasserden University of Waterloo	<i>Socio-ecological Dynamics of Caribbean Coral Reef Ecosystems and Conservation Opinion Propagation</i> V. Thampi University of Waterloo	<i>Optimal Designs with Three Factor Levels and Type I Censoring for Proportional Hazards Models</i> S. Li Brock University	<i>Data Mining for Patterns of User Engagement with a Mobile App (Manage My Pain) for Monitoring and Tracking Chronic Pain</i> Q. Rahman York University
16:00-16:20	<i>Constructing Hyperelliptic Curves of Genus 3 Whose Jacobians Have CM</i> C. Vincent University of Vermont	<i>Coupling Social Norms and Investment Dynamics in a Model of Common Pool Resource Harvesting</i> M. Yodzis University of Guelph	<i>Improving the Traffic Jam for a SCAT-based Controlling System Using Q-learning Method: A Real Case Study in Iran</i> L. Abdolkarimzadeh Amirkabir University of Technology	<i>Resampling Techniques for Estimation and Inferences for Variances</i> Z. Wang Wilfrid Laurier University
16:20-16:40	<i>Complexity of Arithmetic with Multi-Dimensional Digit Representations</i> E. Curry Acadia University		<i>Opinion Target Extraction(OTE) Model Training and Applying OTE to Facilitate Web App Development</i> H. Hu The Education University of Hong Kong	
16:40-17:00	<i>Explicit Restricted Irrationality Measures</i> M. Bauer University of Calgary		<i>Ranking-based QoS Recommendation Approach</i> S. Chai Trent University	

Wednesday, August 23: Afternoon

Time	Room		
	LH3094	LH3098	LH3101
	CS-MODELING #2	SS-AAIP #2	SS-IM #1
	Partial Differential and Integral Equations in Mathematical Modeling Chair: K. Levere University of Guelph	Applied Analysis and Inverse Problems Chair: D. La Torre Nazarbayev University & University of Milan	Industrial Mathematics Chair: Pawel Pralat Ryerson University
15:00-15:20	<i>Numerical Solutions of Boundary-Contact Problems to the Thermal Diffusion Models of Non-Classical Theory Coupled-Elasticity</i> M. Chumburidze Akaki Tsereteli State University	<i>Circle Inversion Iterated Function Systems</i> M. Fitzsimmons University of Guelph	<i>Modelling Calcite Dissolution in a Rotating Disk Reaction Vessel</i> S. Bohun University of Ontario Institute of Technology
15:20-15:40	<i>A Posteriori Error Estimates for a Multiscale Finite Element Method</i> B. Khallih University of Nouakchott Al-Aasriya, Mauritania	<i>Extending the Application of Colour Stealing for Contractive Iterated Function Systems</i> M. Demers University of Guelph	<i>Efficient Inference for Tensor Factorization Toolbox</i> C. Kavaklioglu Ryerson University
15:40-16:00	<i>Numerical Modeling of Hydraulically Fractured Shale Gas Reservoirs</i> I. (Iftikhar) Ali University of Hafr Al-Batin	<i>Total Variation Denoising using Iterated Function Systems on Mappings</i> H. Kunze University of Guelph	<i>Towards Imaging Molecules from Coulomb Explosions</i> D. Babalola University of Ontario Institute of Technology
16:00-16:20	<i>Propagation of Electron Waves in a Homogeneous, Isotropic Semiconductor Half Space</i> A. Sharma University of Horticulture and Forestry, Nauni	<i>On Oscillating Integrals</i> J. Benbourenane Abu Dhabi University	<i>Modelling of Superparamagnetic Beads and the Optimal Placement of Cells in Deep Tissue</i> D. Pasut University of Ontario Institute of Technology
16:20-16:40	<i>Tug of War Games and PDES on Graphs with Applications in Image Processing and Machine Learning</i> A. Elmoataz Université de Caen Normandie	<i>Iterated function systems with place-dependent probabilities and the inverse problem of approximation of measures using moments</i> E.R. Vrscay University of Waterloo	<i>Mathematics of Blockchain: A Double-Edge Sword Helping Criminals and Thwarting Fraud</i> A. Mashatan Ryerson University
16:40-17:00		<i>A problem of reconstruction of discontinuities of a function given in attenuated medium by integrals along geodesics</i> I. Svetov Novosibirsk State University	

Thursday, August 24

Thursday, August 24: Morning

Time	Room			
	LH1009	LH1010	LH1011	LH2066
	SS-FD #1	SS-MFMCR #1	SS-TAVI #1	SS-CC
	Fair Decisions Chair: M. Kilgour Wilfrid Laurier University	Mathematical Finance: Modeling, Computation and Risk Management Chair: J. Campolieti Wilfrid Laurier University	Theory and Applications of Variational Inequalities Chair: M.G. Cojocaru University of Guelph	Computational Chemistry Chair: S. Constas Wilfrid Laurier University
10:00-10:20	<i>Multiwinner Approval Voting: An Apportionment Approach</i> S.J. Brams New York University	<i>Robust Multivariate Portfolio Choice with Stochastic Covariance in Presence of Ambiguity</i> M. Escobar University of Western Ontario	<i>Vaccinating Policy Models as Leader-follower Games with Risk-perception Transition States</i> S. Athar University of Guelph	<i>Studying Properties of RNA Nanotubes with Atomistic-to-continuum Models</i> S. Badu Wilfrid Laurier University
10:20-10:40	<i>Fairness, Voting, and Symmetry</i> M. Orrison Harvey Mudd College	<i>Optimal Hedging of Nontradable Risk in Discrete Time Financial Market Models</i> A. Kolkiewicz University of Waterloo	<i>On Concavity of the Monopolist's Problem Facing Consumers with Nonlinear Price Preferences</i> S. Zhang University of Toronto	<i>Stability of a Transient Protein Complex in a Charged Aqueous Droplet with Variable pH</i> M.I. Oh University of Western Ontario
10:40-11:00	<i>Identifying Top Researchers with Respect to Multiple Aspects of Centrality</i> S. Tavassoli Kaiserslautern University of Technology	<i>Longevity Bond Pricing in Equilibrium</i> T. Pirvu McMaster University	<i>Game Formulation for Distinct Retailers Cybersecurity Investment Models</i> S. Kirbyson University of Guelph	<i>Interactions of Simple Ions in Atmospheric Aerosols</i> C. Graham University of Western Ontario
11:00-11:20	<i>Cycles and Intractability in Social Dichotomy and Trichotomy Rules</i> W. Zwicker Union College, Schenectady	<i>A Geometric Approach to Arbitrage-free Modeling, Estimation, and Prediction</i> C. Hyndman Concordia University	<i>Variational Inequality Theories in Reflexive Banach Spaces and Applications</i> K. Lan Ryerson University	<i>Effect of Charges on the Stability of Non-covalent Complexes: A Computational Study of a DNA Duplex Stability in Charged Nanodrops</i> M. Sharawy University of Western Ontario
11:20-11:40	<i>Continuity and Incentive Compatibility in Cardinal Voting Mechanisms</i> D. Majumdar Concordia University		<i>Bifurcations in N-player Game Dynamics with Variational Inequalities</i> M.G. Cojocaru University of Guelph	
11:40-12:00				

Thursday, August 24: Morning

Time	Room		
	LH3094	LH3098	LH3101
	CS-MODELING #3	SS-AAIP #3	SS-IM #2
	Partial Differential and Integral Equations in Mathematical Modeling Chair: H. Lee Inha University	Applied Analysis and Inverse Problems Chair: H. Kunze University of Guelph	Industrial Mathematics Chair: H. Huang York University
10:00-10:20	<i>Strip-saturation Model for Mode-III Semi-permeable Collinear Cracks Weakening a Piezoelectric Strip</i> P.R. Verma Shaheed Bhagat Singh College	<i>Numerical Solutions for an Extended Class of Boundary Value Problems</i> M. Abushammala Zayed University, Dubai	<i>A Note on Fuzzy Multiattribute Grey Related Analysis Using DEA</i> M.S. Pakkar Laurentian University
10:20-10:40	<i>Numerical Simulations of Reaction-diffusion Equations Modeling Prey-predator Interaction with Delay</i> I. (Ishtiaq) Ali COMSATS Institute of Information Technology	<i>Numerical Stability of an Integral Equation Applicable to the Diagnosis of High-temperature Plasma</i> B. Ibrahim Peoples' Friendship University of Russia	<i>Fuzzy Approach to Elicitation of Preferences Towards Health States</i> B. Kaminski Warsaw School of Economics
10:40-11:00	<i>Multi-Scale Model Formulation of a Porous Medium Biofilm Reactor and the Effect of Planktonic Bacteria and Attachment on Reactor Performance</i> H. Gaebler University of Guelph	<i>Boundary Data Identification for an Electromagnetic Problem by Means of the Potential Field Method</i> T. Kang Communication University of China	<i>Estimating the Crossover Point of a Fuzzy Willingness-to-Pay/Accept for Health to Support Decision Making</i> M. Jakubczyk Warsaw School of Economics
11:00-11:20	<i>Modeling and Simulation of Reaction-Transport Interactions Using Fractional Anomalous Diffusion</i> H. Puebla Universidad Autónoma Metropolitana Azcapotzalco	<i>Population and Pollution Interactions in a Spatial Economic Model</i> D. La Torre Nazarbayev University & University of Milan	
11:20-11:40	<i>A Mathematical and Numerical Framework for Bubble Meta-screens</i> H. Lee Inha University	<i>Error Estimation for Fan Beam Algorithm</i> T. Srivastava Indian Institute of Technology Roorkee	
11:40-12:00		<i>Cubic Zipper Fractal Interpolation Function</i> M.R. Komandla Indian Institute of Technology Madras	

Thursday, August 24: Afternoon

Time	Room			
	LH1009	LH1010	LH1011	LH2066
	SS-FD #2	SS-MFMCR #2	SS-TAVI #2	SS-DETA #1
	Fair Decisions Chair: W. Zwicker Union College, Schenectady	Mathematical Finance: Modeling, Computation and Risk Management Chair: Adam Metzler Wilfrid Laurier University	Theory and Applications of Variational Inequalities Chair: K. Lan Ryerson University	Delay Equations: Theory and Applications Chair: A. Ivanov Penn State University
15:00-15:20	<i>Catch-Up: A Rule That Makes Service Sports More Competitive</i> W. Stromquist New York University	<i>Hedge Funds: Will We See Negative Management Fees?</i> L. Seco University of Toronto	<i>A Hybrid Shrinking Projection Algorithm for Fixed Point Problems and Equilibrium Problems in Hilbert Spaces</i> M.A.A. Khan COMSATS Institute of Information Technology	<i>Implicit State Dependent Delay in Range-based Position Estimation and Navigation</i> E.I. Verriest Georgia Institute of Technology
15:20-15:40	<i>An Axiomatic Approach to Cost Sharing Child Support</i> M.A. Jones Eugene Lang College	<i>Pricing and Hedging Derivatives on Dividends</i> N. Costanzino Barclays Capital, New York	<i>A New Application of Ostrowski Type Inequality in Engineering</i> A. Qayyum University of Hail	<i>Fliess Operators and State Dependent Time Delay Systems</i> M. Thitsa Mercer University
15:40-16:00	<i>Measuring Discord from Preferences Over Indivisible Items</i> B. Hopkins Saint Peter's University	<i>Simulation of Multivariate Mixed Poisson Processes</i> M. Chiu University of Toronto		<i>An Alternative Formulation for a Distributed Delayed Logistic Equation</i> C-J. Lin McMaster University
16:00-16:20	<i>Comparing Direct Algorithms for Two-player Fair Division of Indivisible Items: A Computational Study</i> M. Kilgour Wilfrid Laurier University	<i>Monte Carlo Simulation in Counterparty Credit Risk</i> K. Wouterloot Scotiabank, Toronto		<i>Abstraction-Based Verification and Control of Time-Delay Systems</i> J. Liu University of Waterloo
16:20-16:40		<i>Bankruptcy Prediction and Default Detection Using Genetic Algorithm-Support Vector Machine and Information Complexity</i> J. Salim Jinan University		<i>Stability Criteria of Hybrid Dynamical Systems with Distributed Delays</i> X. Liu University of Waterloo
16:40-17:00				<i>Interaction of Phage-Sensitive and Phage-Resistant Bacterial with Acquisition of Phage Sensitivity</i> T-H. Hsu McMaster University

Thursday, August 24: Afternoon

Time	Room		
	LH3094	LH3098	LH3101
	CS-MODELING #4	CS-ENV #1	CS-DSDE #1
	Partial Differential and Integral Equations in Mathematical Modeling Chair: S. Anco Brock University	Mathematical Modeling in Environmental Sciences and Models of Complex Media Chair: S. Levitsky Shamoon College of Engineering, Israel	Applications of Dynamical Systems and Differential Equations Chair: Y. Tian Shanghai Normal University
15:00-15:20	<i>Common Errors in Finding Conservation Laws of Differential Equation</i> S. Anco Brock University	<i>Large Eddy Simulation of Turbulent Flow over a Hill Using a Canopy Stress Model</i> M.A. Bhuiyan Memorial University of Newfoundland	<i>Comparison of Closed-form Solutions for the Lucas-Uzawa model via the Partial Hamiltonian Approach and the Classical Approach</i> R. Naz Lahore School of Economics
15:20-15:40	<i>On the Breach of Conservation Laws in Fragmentation Processes</i> S.C. Oukouomi Noutchie North-West University, Mahikeng, South Africa	<i>Characterization of Complexity in Anaerobic Digesters using Fractal Analysis</i> H. Puebla Universidad Autónoma Metropolitana Azcapotzalco	<i>Existence and Continuation Theorems of Caputo Type Fractional Differential Equations</i> S. Sarwar Shanghai University
15:40-16:00	<i>The Preserving Neutron Flux Properties Discrete Scheme for Multi-media Time-dependent Neutron Transport Equations</i> Z. Hong Institute of Applied Physics and Computational Mathematics, Beijing	<i>Temperature Effect on Sound Scattering by Fine Bubbles in Viscoelastic Liquid</i> S. Levitsky Shamoon College of Engineering, Israel	<i>Hopf bifurcation and stability analysis in delayed neural networks</i> E. Javidmanesh Ferdowsi University of Mashhad
16:00-16:20	<i>MOLT Based Fast High-Order Three Dimensional A-Stable Scheme for Wave Propagation</i> M. Thavappiragsam Michigan State University	<i>Forest Transitions, Land Use, and Ecological Thresholds</i> R. Gooding-Townsend University of Waterloo	<i>Coupled Axial, In Plane and Out of Plane Bending Vibrations of Cable Harness Space Structures</i> K. Yerrapragada University of Waterloo
16:20-16:40		<i>Competition Between Injunctive Social Norms and Conservation Priorities Gives Rise to Complex Dynamics in a Model of Forest Growth and Opinion Dynamics</i> R. Sigdel University of Guelph	<i>Computation of the Expansion of Melnikov Functions Around a Homoclinic Loop</i> Y. Tian Shanghai Normal University
16:40-17:00			<i>A New Approach to Construct First Integrals and Closed-form Solutions of Dynamical Systems for Epidemics</i> I. Naeem Lahore University of Management Science

Friday, August 25


Friday, August 25: Morning

Time	Room			
	LH1009	LH1010	LH1011	LH2066
	SS-MMNN1 #1	CS-FINANCE #1	SS-NDSA #1	SS-DETA #2
	Mathematical Models for Nanoscience and Nanotechnology Chair: Z. Miskovic University of Waterloo	Financial Mathematics and Computation Chair: C. Lin Providence University, Taiwan	Nonlinear Dynamical Systems and Applications Chair: X. Liu University of Waterloo	Delay Equations: Theory and Applications Chair: E. Verriest Georgia Institute of Technology
10:00-10:20	<i>Longitudinal and Transverse Plasmon excitations in Electron Energy Loss Spectroscopy of Graphene</i> K. Akbari University of Waterloo	<i>High-order Scheme for Option Pricing with Stochastic Volatility and Jumps in Returns</i> A. Pitkin University of Sussex	<i>Intermittent Sampled-Data Control of Cellular Neural Networks</i> K. (Kexue) Zhang University of Waterloo	<i>Convergence Order of Collocation Methods for Volterra Functional Integral Equations with Non-vanishing Delays</i> C. Huang Huazhong University of Science and Technology
10:20-10:40	<i>Modeling the Interactions of Graphene with a Liquid Electrolyte</i> L. Daniels University of Waterloo	<i>Identifying Jump-diffusion Model Pricing Parameters with an Optimal Control Approach</i> J. Miles University of Sussex	<i>Exponential Stability of Discrete-Time Impulsive Switched Singular Systems with Time-Delay</i> H. Kiyak University of Waterloo	<i>On linear and nonlinear equations with two delays</i> E. Braverman University of Calgary
10:40-11:00	<i>Nonlocal Optical Response of Nanowire-film System: Gap Effects</i> A.K. Tiwari Wilfrid Laurier University	<i>Methodology for Estimating Loss Given Default (LGD) and Probability of Default (PD) Correlations under Economic Downturn</i> W.S. Avusuglo University of Western Ontario	<i>Function Matrix Projective Synchronization via Hybrid Control Between Two Different Complex Networks</i> X. (Xin) Wang University of Electronic Science and Technology of China	<i>A Periodicity Problem in a Nonlinear Differential Delay System</i> A. Ivanov Pennsylvania State University
11:00-11:20	<i>Modelling and Design of Nano-structures: Multilayer Nanoplasmonics Configurations</i> H. Kurkcu Gulf University for Science and Technology	<i>One-dimensional Partial Differential Equations for Asian Option Prices</i> C. Lin Providence University, Taiwan	<i>Robust Reliable H_∞ Control and Input-to-state Stabilization for Switched Systems</i> M. Alwan Ryerson University	<i>Stability and Periodicity in a Two-Dimensional Neural Network Model with Delay</i> Z. Dzalilov Federation University Australia
11:20-11:40			<i>Asynchronous Control of Switched Nonlinear Time-Delay Systems via The T-S Fuzzy Model</i> J. Ren University of Electronic Science and Technology of China	
11:40-12:00			<i>Linearization and Local Topological Conjugacies for Impulsive Systems</i> K. Church University of Waterloo	

Friday, August 25: Morning

Time	Room		
	LH3094	LH3098	LH3101
	CS-MODELING #5	CS-ENV #2	CS-DSDE #2
	Partial Differential and Integral Equations in Mathematical Modeling Chair: M. Usman University of Dayton	Mathematical Modeling in Environmental Sciences and Models of Complex Media Chair: M. Ashrafizaadeh Isfahan University of Technology	Applications of Dynamical Systems and Differential Equations Chair: M. Demers University of Guelph
10:00-10:20	<i>Mathematical Model of Binder Distribution During Drying of Lithium-Ion Battery Electrodes</i> F. Font McMaster University	<i>Anticipating Critical Transitions in Socio-ecological Systems</i> T. Bury University of Waterloo	<i>The Effect of Water Vapour Feedback as a Greenhouse Gas on a Simple Slab Model of the Earth's Atmosphere</i> B. Dortmans University of Guelph
10:20-10:40	<i>Mathematical Modelling of Asymmetric Magnetic Recording Heads Without an Under-layer Utilising the Superposition Method</i> E.M. Ammar Duhok Polytechnic University	<i>Impact of Spatial Structure and Human Dynamics on Environment Systems</i> K.R. Fair University of Waterloo	<i>Two Sides of Delayed Dispersal in Metapopulation Dynamics with Allee-like Effect</i> J. Xu University of Western Ontario
10:40-11:00	<i>Mathematical Modelling of Double Nonlinear Processes with Source or Absorption</i> M. Aripov National university of Uzbekistan	<i>Turbulent Diffusion of Inertial Particle Pairs Such As in Pollen and Sandstorms</i> S. Usama King Fahd University of Petroleum and Minerals	<i>Dynamical Analysis of a Modified Predator-prey Model for Venture Capital Investment</i> L. Addison The University of the West Indies
11:00-11:20	<i>Computational Study of Eventual Periodicity of Forced Oscillations of an Initial-Boundary-Value Problem of the KdV Type Equation</i> M. Usman University of Dayton	<i>A Comparative Study of Diffusion Term Appearing in Various Nonlinear Gas Transport Models in Tight Rocks</i> I. (Iftikhar) Ali University of Hafr Al-Batin	<i>On Block Vandermonde Matrices</i> M. Yaici University Of Bejaia
11:20-11:40		<i>On Implementation of a Pseudo-potential Model in the Meshless Lattice Boltzmann Method</i> M. Ashrafizaadeh Isfahan University of Technology	<i>Nonstandard Finite Difference Scheme for Vector Disease Models</i> C. Bekoe Prince of Songkla University
11:40-12:00		<i>Modeling and Simulation of an Anaerobic Digester Treating Solid Organic Wastes</i> J.G. Vian-Pérez Universidad Autónoma Metropolitana Azcapotzalco	

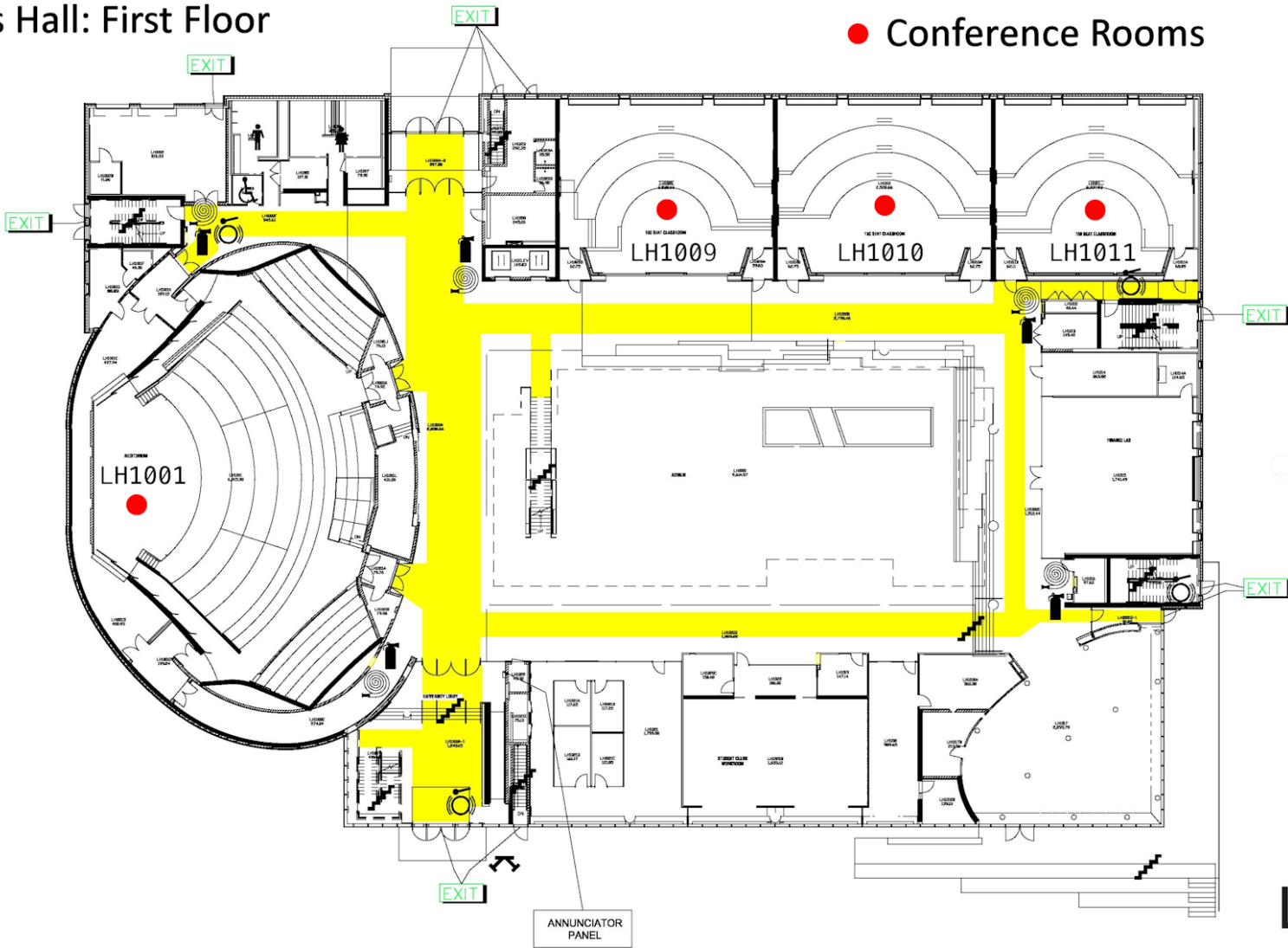
Friday, August 25: Afternoon

Time	Room	LH1010	LH1011	LH2066
	LH1009	LH1010	LH1011	LH2066
	SS-MMNN1 #2	CS-FINANCE #2	SS-NDSA #2	What's New in Maple 2017?
	Mathematical Models for Nanoscience and Nanotechnology Chair: H. Majedi University of Waterloo	Financial Mathematics and Computation Chair: A. Melnikov University of Alberta	Nonlinear Dynamical Systems and Applications Chair: M. Alwan & K. Zhang University of Waterloo	 J. Gerhard Maplesoft
15:00-15:20	<i>Photoluminescence in Quantum Emitter and Metallic Nanoshell Hybrids</i> S. Balakrishnan University of Waterloo	<i>Algorithms for Flow Trades at NASDAQ around its Close</i> C. Yan Alberta Investment and Management Corporation (AIMCo)	<i>Experimental Investigation of Automatic Ball Balancer Effect on Unbalanced Rotor Vibration</i> M. Makram Military Technical College, Egypt	What's New in Maple 2017?
15:20-15:40	<i>Nonlinear Coupled Effects in Nanomaterials and their Application for Energy Harvesting</i> S. Bhowmick Wilfrid Laurier University	<i>On Characterization of Option Price Boundaries via Comparison of Stochastic Processes and Market Completions</i> A. Melnikov University of Alberta	<i>Modeling of Bubble Motion in a Viscid Liquid under Microgravity</i> D. Khattar University of Delhi	J. Gerhard Senior Director of Research, Maplesoft Details on p. 8
15:40-16:00		<i>Stochastic Modeling of Asynchronous Assets with Jump-Diffusion Processes</i> Y. (Yuxin) Chen Wilfrid Laurier University	<i>Characterization of Fluid Dynamics in Capillary Vessels: Applications for Drug Delivery</i> S.C. Abou William V.S. Tubman University	
16:00-16:20		<i>Long-Term Optimal Portfolio Selection Problem</i> B. Hu Wilfrid Laurier University	<i>Stability and Hopf Bifurcation of a Diffusive Predator-Prey Model with Delay Effect</i> C. Celik Bahçeşehir Univeristy, Istanbul	
16:20-16:40				
16:40-17:00				

14. Maps

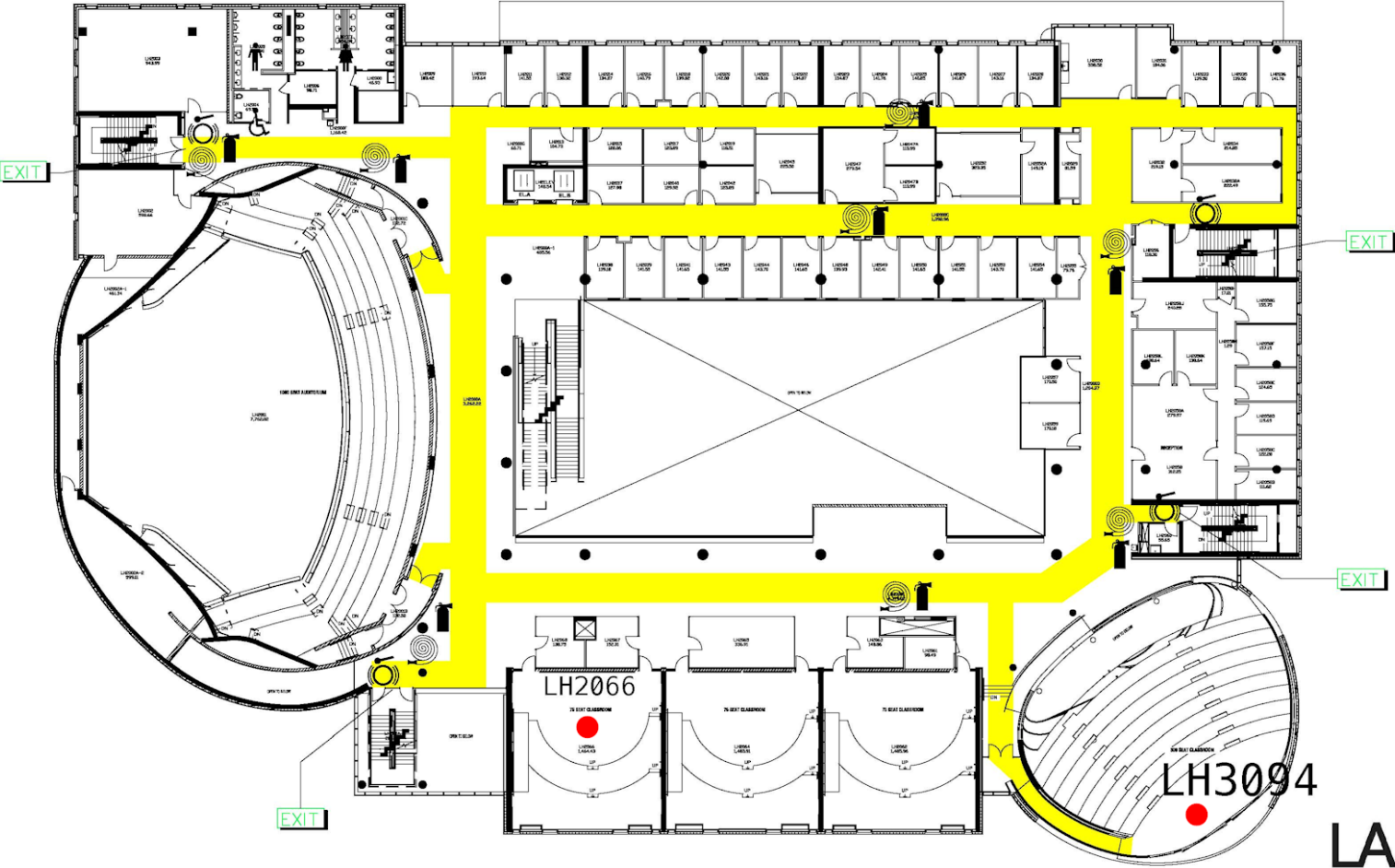
Lazaridis Hall: First Floor

● Conference Rooms



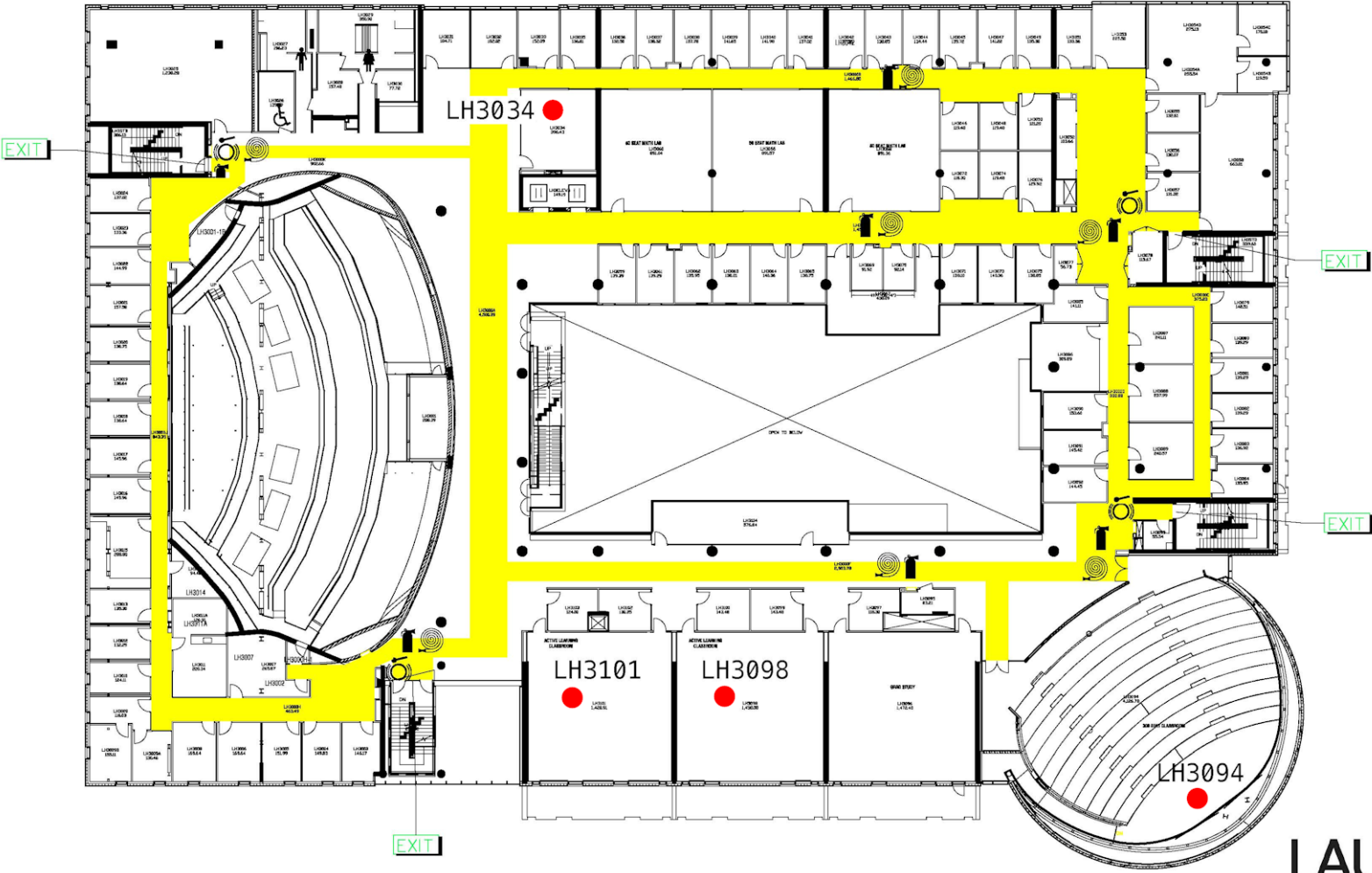
Lazaridis Hall: Second Floor

● Conference Rooms

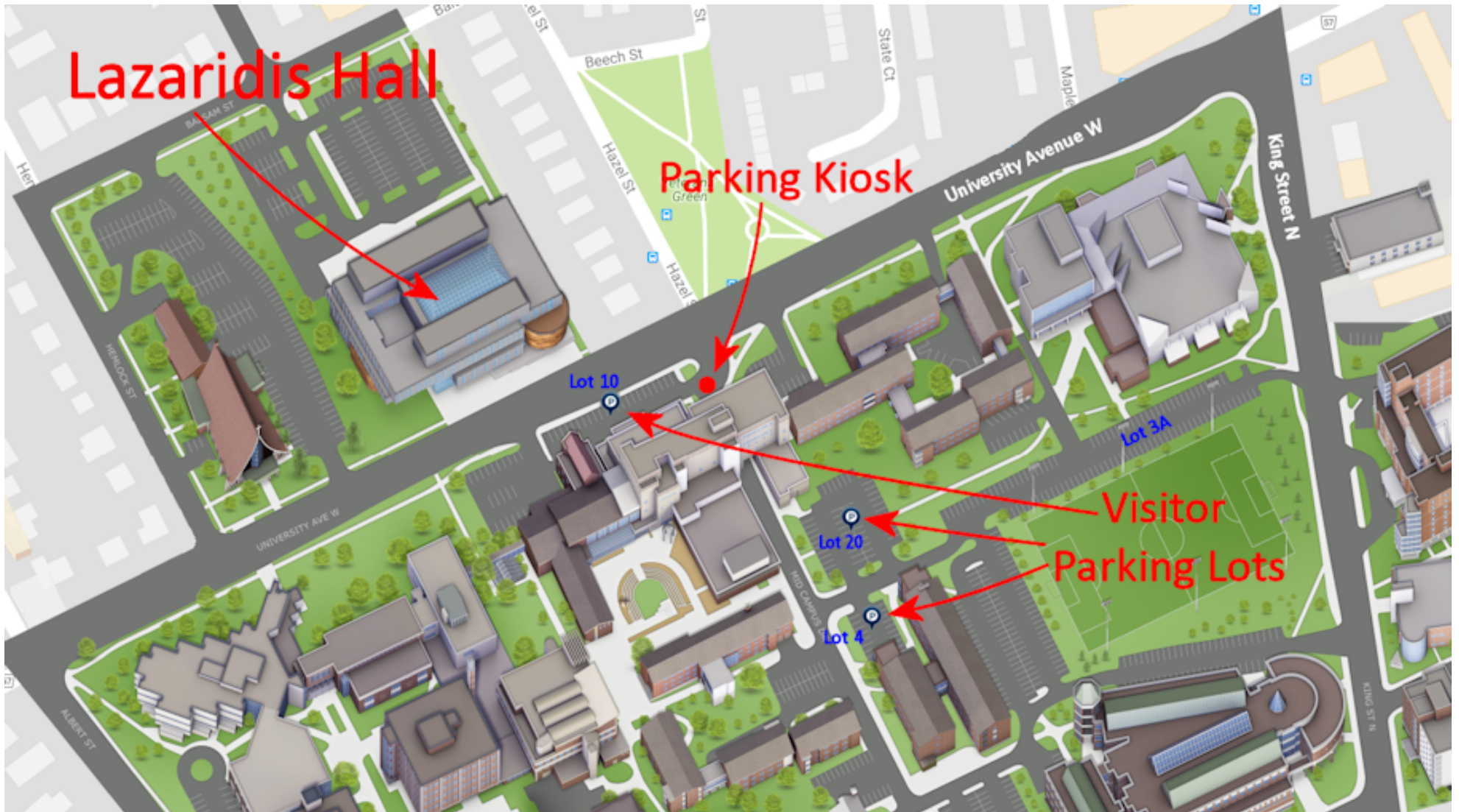


Lazaridis Hall: Third Floor

● Conference Rooms



Wilfrid Laurier University Campus & Parking



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