CSME SCGM
THE CANADIAN SOCIETY FOR MECHANICAL ENGINEERING
LA SOCIÉTÉ CANADIENNE DE GÉNIE MÉCANIQUE

Société canadienne de CFD Society of Canada

CSME-CFDSC Congress 2019

Joint Congress of the Canadian Society for Mechanical Engineering and CFD Society of Canada

Congress Program

Western University, London, ON, June 2-5, 2019

Western UNIVERSITY · CANADA

Department of Mechanical and Materials Engineering

PROGRAM AT GLANCE

June 2, 2019 (Sunday)														
4:00 PM - 7:00 PM	Registration and Welcome Reception (Amit Chakma Engineering Building Atrium)													
June 3, 2019 (Monday)														
8:00 AM - 4:00 PM	Conference Registration (Amit Chakma Engineering Building Atrium)													
8:30 AM - 9:30 AM	CSME-CFDSC Congress Opening Ceremony Plenary Session (Ivey BMO Auditorium): "Artificial Knees: Can They Benefit from New Technologies?" Peter Walker (New York University)													
9:30 AM - 10:00 AM	Coffee Break (Amit Chakma Engineering Building Atrium)													
	Technical Sessions (CSME Track)										Technical Sessions (CFDSC Track)			
10:00 AM - 12:00 PM	Session A-1 Advanced Manufacturing I	Session B-1 Advanced Energy Systems I	Session C-1 Biomechanics I	Session D-1 Biomedical Engineering I	Session E-1 Energy Materials I	Session F-1 Heat Transfer I	Session G-1 Fluid Mechanics I	Session H-1 Micro- Nano-Technologies I	Session J-1 Materials Engineering I	Session K-1 Solid Mechanics I	Session L-1 Large Eddy Simulation	Session M-1 Free Surface Flows	Session N-1 Heat and Mass Transfer I	Session O-1 Applications I
	ACEB 1410	ACEB 2440	SEB 1056	SEB 1059	ACEB 1450	SEB 2099	SEB 2100	ACEB 2435	ACEB 1415	ACEB 1420	SEB 1200	SEB 2200	SEB 2202	SEB 3109
12:15 PM - 1:00 PM	Lunch (Amit Chakma Engineering Buildling Atrium) and CSME Technical Committees Meetings													
1:00 PM - 2:00 PM	Plenary Session (Ivey BMO Auditorium): "Petascale Supercell Thunderstorm Simulations and New Hypothesis for Tornado Formation and Maintenance" Leigh Orf (University of Wisconsin)													
2:00 PM - 2:30 PM	Coffee Break (Amit Chakma Engineering Building Atrium)													
	Session A-2 Additive Manufacturing I	Session B-2 Advanced Energy Systems II	Session C-2 Engineering Analysis & Design	Session D-2 Biomedical Engineering II	Session E-2 Energy Materials II	Session F-2 Fluid Mechanics II	Session G-2 Fluid Mechanics III	Session H-2 Micro- Nano-Technologies II	Session J-2 Materials Engineering II	Session K-2 Solid Mechanics II	Session L-2 Algorithms	Session M-2 Environmental Flows	Session N-2 Heat and Mass Transfer II	
	ACEB 1410	ACEB 2440	SEB 1056	SEB 1059	ACEB 1450	SEB 2099	SEB 2100	ACEB 2435	ACEB 1415	ACEB 1420	SEB 1200	SEB 2200	SEB 2202	
5:00 PM - 7:30 PM	Various Tours													
June 4, 2019 (Tuesday)														
8:00 AM - 4:00 PM	Conference Registration (Amit Chakma Engineering Building Atrium)													
8:30 AM - 9:30 AM	Plenary Session (Ivey BMO Auditorium): "Advances in Numerical Modelling of Flow, Heat, and Mass Transfer in Heterogeneous Media" Marcelo de Lemos (Instituto Tecnológico de Aeronáutica)													
9:30 AM - 10:00 AM	Coffee Break (Amit Chakma Engineering Building Atrium)													
10:00 AM - 12:00 PM	Session A-3 Advanced Manufacturing II	Session B-3 Robotics, Mechatronics, Automation I	Session C-3 Biomechanics II	Session D-3 Environmental Engineering I	Session E-3 Energy Materials III	Session F-3 Heat Transfer II	Session G-3 Fluid Mechanics IV	Session H-3 Transportation Systems I	Session J-3 Materials Engineering III	Session K-3 Solid Mechanic III	Session L-3 Porous Media	Session M-3 Turbulence I	Session N-3 Multiphase Flows I	
	ACEB 1410	ACEB 2440	SEB 1056	SEB 1059	ACEB 1450	SEB 2099	SEB 2100	ACEB 2435	ACEB 1415	ACEB 1420	SEB 1200	SEB 2200	SEB 2202	
12:15 PM - 1:00 PM	Lunch (Amit Chakma Engineering Buildling Atrium)													
1:00 PM - 2:00 PM	Plenary Session (Ivey BMO Auditorium): "Advanced Materials for Energy Storage and Conversion: From Nano Scale to Single Atoms" Andy Sun (Western University)													
2:00 PM - 2:30 PM	Coffee Break (Amit Chakma Engineering Building Atrium)													
2:30 PM - 4:30 PM	Session A-4 Additive Manufacturing II	Session B-4 Advanced Energy Systems III	Session C-4 Materials Engineering IV	Session D-4 Biomedical Engineering III	Session E-4 Environmental Engineering II	Session F-4 Fluid Mechanics V	Session G-4 Fluid Mechanics VI	Session H-4 Transportation Systems II	Session J-4 Materials Engineering V	Session K-4 Solid Mechanics IV	Session L-4 Applications II	Session M-4 Turbulence II	Session N-4 Multiphase Flows II	
	ACEB 1410	ACEB 2440	SEB 1056	SEB 1059	ACEB 1450	SEB 2099	SEB 2100	ACEB 2435	ACEB 1415	ACEB 1420	SEB 1200	SEB 2200	SEB 2202	
4:30 PM - 5:15 PM	NSERC Panel on Grants and Scholarships (Room: ACEB 1410)													
6:00 PM - 9:30 PM	Congress Banquet (Great Hall, Somerville House), Cash Bar (5:30 PM - 6:00 PM)													
June 5, 2019 (Wednesday)														
8:30 AM - 9:30 AM	CSME-CFDSC Congress Closing Ceremony Plenary Session (Ivey BMO Auditorium): "Resilient Manufacturing System" Ruxu Du (South China University of Technology)													
9:30 AM - 10:00 AM	Coffee Break (Amit Chakma Engineering Building Atrium)													
10:00 AM - 12:00 PM	Session A-5 Advanced Manufacturing III	Session B-5 Robotics, Mechatronics, Automation II	Session C-5 Biomechanics III	Session D-5 Biomedical Engineering IV	Session E-5 Energy Materials IV	Session F-5 (Heat Transfer III)	Session G-5 Fluid Mechanics VII	Session H-5 Nuclear Materials	Session J-5 Materials Engineering VI	Session K-5 Wind Energy and Engineering	Session L-5 Aerodynamics	Session M-5 Particulate Flows	Session N-5 Non-Newtonian Flows	
	ACEB 1410	ACEB 2440	SEB 1056	SEB 1059	ACEB 1450	SEB 2099	SEB 2100	ACEB 2435	ACEB 1415	ACEB 1420	SEB 2202	SEB 2200	SEB 3109	
	End of the CSME-CFDSC Congress 2019													

Message from the 2019 CSME International Congress Chair

Welcome to the 2019 CSME International Congress. The Congress is hosted by the Department of Mechanical and Materials Engineering at the Western University. We have the privilege to host the CSME Congress again after 15 years. We are very pleased to co-host this year's Congress with the CFD Society of Canada. This joint Congress provides a unique opportunity to bring researchers and students whose interests align with both societies to a common platform that facilitates the dissemination of results from cutting-edge research as well as networking opportunities among academia, government agencies and industry. We hope that this joint Congress will further strengthen the ties between the two societies.

This two and a half day Congress has an extensive technical program featuring plenary lectures from internationally-recognized distinguished speakers, technical symposia, CSME Student Paper Competition, CSME Student Design Competition, NSERC Workshop on grants and scholarships, Annual General Meeting of the CSME Board, meetings of various Technical Committees of CSME and tours of various state-of-the-art research facilities.

CSME is sponsoring three of the five plenary lectures covering a broad range of mechanical engineering topics. Dr. Peter Walker, Professor at the New York University in the area of Biomechanics will speak about the recent advancements in artificial knees. Dr. Andy Sun, Professor at the Western University in the area of Nano-materials will talk about novel applications of Nano-materials for energy storage. Dr. Ruxu Du, Professor at South China University of Technology in the area of Advanced Manufacturing will talk about a new idea of resilient manufacturing.

The CSME Congress has 17 technical symposia covering all key areas in the mechanical engineering discipline. These symposia are comprised of 282 technical presentations including eight Keynote presentations, all run in 10 parallel sessions. The Congress has also organized tours of various state-of-the-art research facilities at Western and collaborating institutes including Fraunhofer Project Centre, the WindEEE Dome, the Boundary Layer Wind Tunnel, National Research Council, Canadian Centre for Product Validation, Wolf Orthopedic Biomechanics Lab and Energy Materials Lab.

A large number of CSME-CFDSC Congress participants are also attending the co-located Industry 4.0 Symposium. This symposium provides an opportunity to learn about new trends in Industry 4.0, and meet and network with relevant academic and industry people.

I would like to thank all individuals who have contributed to the organization of the Congress, especially, the members of the Congress Organizing Committee, Western Conference Services, symposia organizers, student volunteers and session chairs.

We also gratefully acknowledge the generous sponsorships from the Faculty of Engineering, Western University, High Speed Imaging, FLIR, Delta Photonics, Bombardier and Canadian Science Publishing.

I hope you have a great time at the Congress

Kamran Siddiqui
2019 CSME Congress Chair

CSME SCGM

Message from the Co-Chairs of 27th Annual CFDSC Conference

On behalf of the Computational Fluid Dynamics Society of Canada (CFDSC), we welcome you to the 2019 Joint Congress of the Canadian Society for Mechanical Engineering and the CFD Society of Canada. This is the 27th Annual Conference of the CFDSC and marks the second time that the event has been hosted by Western University. Much of the event will be hosted within the newly-opened Amit Chakma Engineering Building, which is pursuing LEED® Platinum Certification for its sustainable design. A number of tours have been organized to showcase the state-of-the-art facilities at Western, including the Fraunhofer Project Centre, the WindEEE Dome, and the Boundary Layer Wind Tunnel. We are excited for all of the conference participants to experience and enjoy the picturesque Western campus and all of its facilities.

We are very pleased to have had the opportunity to co-locate our conference with that of the Canadian Society for Mechanical Engineering (CSME). By combining the strengths of our two distinct events, we believe that we have created a technical program for the Joint Congress that is greater than the sum of its parts. We hope that this event will help foster further collaboration between the two Societies.

The Joint Congress features five plenary lectures from internationally-recognized distinguished speakers. The CFDSC speakers include Leigh Orf (University of Wisconsin) and Marcelo de Lemos (Instituto Tecnológico de Aeronáutica, Brazil). Dr. Orf will speak on his recent work involving petascale simulations of supercell thunderstorms and will discuss his latest hypothesis for tornado formation and their maintenance. Dr. de Lemos will be speaking about recent advances that have been made by his research group in numerical modelling of flow, heat, and mass transfer in heterogenous media. Both of these plenary lectures, as well as the three CSME-themes lectures, are sure to be fascinating. The CFDSC technical program includes 16 symposia with a total of 83 presentations from CFD researchers in all parts of Canada, as well as several other countries around the world. Additionally, we will feature several undergraduate posters and three-minute thesis talks.

We gratefully acknowledge the sponsors of the conference, including Bombardier, Delta Photonics, High Speed Imaging Inc., FLIR, Canadian Science Publishing and Western Engineering. Additionally, we thank all of the volunteers, session chairs, and the scientific committee for helping to make this event a success.

Sincerely,

Chris DeGroot

Co-Chair, CFDSC 2019 Conference

Chao Zhang

Co-Chair, CFDSC 2019 Conference

Société canadienne de CFD Society of Canada

Congress Organizing Committee

Kamran Siddiqui
Chair
CSME International Congress and Technical Program
Western University

Christopher DeGroot

Co-Chair
CFDSC Annual Conference

Western University

Chao Zhang

Co-Chair
CFDSC Annual Conference

Western University

Ryan Willing
Communications Chair
Western University

Liying Jiang
Publications Chair
Western University

Remus Tutunea-Fatan
Exhibitions Chair
Western University

Plenary Speaker (Sponsored by CSME and Western's Bone & Joint Institute)

Artificial Knees: Can They Benefit from New Technologies?

Peter S. Walker, PhD

Professor, New York University Langone Orthopaedic Hospital
Director, Laboratory for Orthopaedic Implant Design
Professor, Dept. of Mechanical & Aerospace Engineering, New York University

ABSTRACT

The volume of total knee replacements in North America has reached about 700,000 per year and several billion dollars. The early designs of total knee were produced in the 1970's based on collaboration between surgeons and bioengineers, with companies providing the manufacturing technology. The basic engineering principles of the laxity and stability, the kinematics, the fixation of the components to the bone, and the factors affecting wear, were developed in parallel. Since 1980, there has been an ever-increasing amount of research and clinical evaluations, including new design concepts, but 90% of the total knees used by surgeons today are still of two types designed in the 1970's, the posterior cruciate-retaining and the posterior-stabilized designs. The main application of the research since then has mainly been directed to refinements with the result that survivorship has reached a level of around 90 percent at 20 years. Since about the year 2000, a computer-assisted approach has produced several methods for improving the accuracy and consistency of the surgical technique, yet the uptake has been only around 10 percent. An important question today is to what extent technology can further improve the treatment of the arthritic knee and in what ways bioengineers can have a significant further impact. Two areas will be discussed as possible approaches. The first is to develop new methodologies for evaluating the performance of total knees in a way which will identify the optimal result achievable for each individual patient. The second is to formulate implant designs, manufacturing technologies, and surgical techniques, which will deliver those optimal results on an individual basis at a cost affordable to the health care system.

BIOGRAPHY

Dr. Peter Walker has completed a PhD at the University of Leeds. Since then he has been an active participant in the field of biomechanics of joints and the design of joint replacements, with a major emphasis on the knee. He has collaborated with surgeons and bioengineers at renowned institutions, including the Hospital for Special Surgery, Howmedica (Stryker), Brigham & Women's Hospital, Royal National Orthopaedic Hospital, University College London, and currently at New York University Langone Orthopaedic Hospital. He has co-authored over 300 articles with almost 12,000 citations. The basic research has contributed to innovative ideas for total knee design, while many of the test machines and methodologies have been emulated by other labs. Dr. Walker has been a co-designer of several successful total knee systems, the most notable being the Total Condylar, Graduated Knee System, Kinematic & Kinemax, Smiles Bone Tumor System, NexGen and Persona. In 2018, Dr. Walker was chosen as the recipient of the Lifetime Achievement award by The Knee Society, a high honor only given every two years.

Monday, June 3rd (8:30 am – 9:30 am), Ivey BMO Auditorium

Plenary Speaker (Sponsored by CSME)

Advanced Materials for Energy Storage and Conversion: From Nano Scale to Single Atoms

Andy (Xueliang) Sun, PhD

Professor and Canada Research Chair (Tier I)
Department of Mechanical and Materials Engineering
Western University

ABSTRACT

In this talk, Dr. Sun will talk about application of nanotechnology such as atomic layer deposition (ALD) to address challenges in both lithium ion batteries and low temperature fuel cells. The advanced rechargeable batteries have attracted intensive research attention as one promising solution to solve the global energy and environment problems due to high energy density and long working life. A few successful examples from his work will be given including lithium-sulfur (Li-S) batteries, alkali metal-oxygen (Li-O2, Na-O2) batteries and all-solid-state batteries. In addition, fuel cells still have challenges ahead which are hindering the market implementation of low temperature fuel cell technology, mainly high cost of materials and the durability during fuel cell life-time operation. The high cost is primarily associated with precious metal catalysts (Pt or Pt alloys). His group used ALD to control the size of Pt down to single Pt atom catalysts. Dr. Sun will also discuss some future perspectives.

BIOGRAPHY

Dr. Andy (Xueliang) Sun is a Professor and senior Canada Research Chair (Tier I) for the development of nanomaterials for clean energy, at the Western University. Dr. Sun received his Ph.D degree in Materials Chemistry at the University of Manchester, UK, in 1999. Dr. Sun's research is focused on advanced nanostructured materials for energy conversion and storage including fuel cells and Li batteries. Dr. Sun was named as Web of Science "Highly Cited Researchers" in 2018 by Clarivate Analytics. Dr. Sun is an author and co-author of over 370 refereed-journals with citations of over 20,000 times and H-index of 72. He edited 3 books and published 16 book chapters as well as filed 18 US patents. Dr. Sun is actively collaborating with industries and government labs such as Ballard Power Systems, General Motors, Lithium Phostech Inc., 3M, and GLABAT Solid-State Battery Inc. He also serves as an Editor-in-Chief of "Electrochemical Energy Review" under Spring-Nature and an Associate Editor for Frontier of Energy Storage (2013-present). Dr. Sun received various awards such as Early Researcher Award, Canada Research Chair, University Faculty Scholar Award, Western Engineering Prize for Achievement in Research, Fellow of Royal Society of Canada, Fellow of the Canadian Academy of Engineering, Professional Achievement Awards from Cross-cultural Professionals Association of Canada, Award for Research Excellence in Materials Chemistry Winner from Canada Chemistry Society and Award of Merit of the Federation of Chinese Canadian Professionals.

Tuesday, June 4th (1:00 pm – 2:00 pm), Ivey BMO Auditorium

Plenary Speaker (Sponsored by CSME and Industry 4.0)

Resilient Manufacturing System

Ruxu Du, PhD, FCAE, FSME, FASME
Professor
S. M. Wu School of Intelligent Manufacturing
South China University of Technology
Guangzhou, China

ABSTRACT
In the past two years, the world's manufacturing environment has been completely changed from in-favor of globalization to that of nationalization. As a result, companies large or small will have to face ever increasing government regulation, resources restriction and market limitation. To survive such a harsh environment, companies will have to make their manufacturing system resilient. In this talk, we introduced the idea of resilient manufacturing system. It consists of four parts: (1) Product design and optimization, (2) Manufacturing system modeling and optimization, (3) Advanced manufacturing methods, and (4) Market and supply-chain management. The talk includes a couple of examples, which demonstrates the uses of reconfigurable machines and buffers as well as prioritizing resources can improve the resilience of manufacturing systems .

BIOGRAPHY
Dr. Ruxu Du has received his Ph.D. degree from the University of Michigan in 1989. He has taught at the University of Windsor, in Windsor, Ontario, Canada, the University of Miami, in Coral Gables, Florida, USA, and the Chinese University of Hong Kong, in Hong Kong SAR. He has built several institutes, including the Institute of Precision Engineering of in the Chinese University of Hong Kong, and Guangzhou Chinese Academy of Sciences Institute of Advanced Technology. Currently, he is a Professor and the founding Dean of S. M. Wu School of Intelligent Engineering in the South China University of Technology. His area of research include: design and manufacturing, as well as robotics and automation. He has published over 450 papers in various academic journals and international conferences. He is the associate editor / the members of editorial board of six international journals. He has received a number of awards including Fellow of Canadian Academy of Engineering; Fellow of SME (Society of Manufacturing Engineers); Fellow of ASME (Society of American Mechanical Engineers); Fellow of HKIE (Hong Kong Institute of Engineers).

Wednesday, June 5th (8:30 am – 9:30 am), Ivey BMO Auditorium

Plenary Speaker (Sponsored by CFDSC)

Petascale Supercell Thunderstorm Simulations and New Hypothesis for Tornado Formation and Maintenance

Leigh Orf, PhD
Atmospheric scientist
Cooperative Institute for Meteorological Satellite Studies
University of Wisconsin

ABSTRACT

Each year tornadoes wreak devastation throughout the world. The United States experiences the highest frequency of thunderstorms that produce the strongest tornadoes, those ranked EF4 and EF5 on the Enhanced Fujita scale. Leigh Orf's current research focuses on the nature of these violently tornadic supercell thunderstorms primarily through the use of high resolution numerical modeling and visualization. In this presentation he will report on recent simulations of supercell thunderstorms conducted on the Blue Waters supercomputer, at up to 10 meter isotropic grid spacing. Simulations include violently tornadic supercells in two different environments based upon observations where real tornadoes formed. A new hypothesis for tornado formation and maintenance will be presented. In addition to presenting animations of highly resolved thunderstorms, the software and technology behind the simulations will be explained, with some discussion about the use of physical cloud models in wind engineering research.

BIOGRAPHY

Dr. Leigh Orf is an atmospheric scientist at the Cooperative Institute for Meteorological Satellite Studies at the University of Wisconsin. Leigh received his PhD in 1997 at the University of Wisconsin and was faculty at the University of North Carolina - Asheville and Central Michigan University before returning to the UW in 2015. His research focuses on the dangerous winds that occur in thunderstorms, primarily through the use of numerical models run on supercomputers to simulate entire thunderstorm clouds and their surrounding environment. He is primarily interested in the processes involved in the formation of downbursts and the genesis and maintenance of tornadoes. He has developed routines to manage and visualize, with very high fidelity, the tremendous of data produced in these simulations to provide new insight into the most dangerous storms.

Monday, June 3rd (1:00 pm – 2:00 pm), Ivey BMO Auditorium

Plenary Presentation (Sponsored by CFDSC)

Advances in Numerical Modelling of Flow, Heat, and Mass Transfer in Heterogeneous Media

Marcelo J.S. de Lemos, PhD, FASME
Professor
Departamento de Energia – IEME
Instituto Tecnológico de Aeronáutica – ITA
São José dos Campos, Brazil

ABSTRACT

Engineering and natural systems of practical relevance can be modelled as a porous structure through which a working fluid permeates. Engineering equipment design and environmental impact analyses can benefit from appropriate modeling of turbulent flow in permeable media. Turbulence models proposed for such heterogeneous media depend on the order of application of time and volume average operators. Two developed methodologies, following the two orders of integration, lead to different governing equations for the statistical quantities. This lecture reviews recently published methodologies to mathematically characterize turbulent transport in porous media. The concept of double-decomposition is discussed and models are classified in terms of the order of application of time and volume averaging operators, among other peculiarities. Thermal non-equilibrium between phases is discussed. For hybrid media, involving both a porous structure and a clear flow region, difficulties arise due to the proper mathematical treatment given at the interface. This lecture discusses numerical solutions for such hybrid medium. In addition, macroscopic forms of buoyancy terms are presented for both mean and turbulent fields. Cases reviewed include heat transfer in porous enclosures, cavities partially filled with porous material, moving bed systems, combustion in porous burners and double-diffusion effects in porous media.

BIOGRAPHY

Prof. de Lemos has obtained his PhD degree from Purdue University, USA. He spent a year as Assistant Professor at PUC-RJ in 1984, followed by two years as Resident Associate at Argonne National Laboratory, Illinois. In 1986, he joined the Aeronautical Institute of Technology -ITA in São José dos Campos, Brazil. He is Full Professor at ITA, founder and head of the Computational Transport Phenomena Laboratory -LCFT and the newly established Competence Center for Energy – CCE. He also serves as Head of the Department of Energy. Prof. de Lemos has set a new mathematical framework for novel treatment of turbulent flow, heat, and mass transfer through permeable media. He has published more than 370 articles in conference proceedings and journals in addition to ten book chapters and five books. He is member of the Honorary Editorial Advisory Boards of Int. J. Heat & Mass Transfer and Int. Comm. Heat & Mass Transfer, member of the Editorial Advisory Board of J. Porous Media and Editorial Board Member of Int. J. Dynamics of Fluids and Int. J. Applied Engineering Research. He has coordinated several joint research projects with DLR and Uni-Erlangen, Germany, and has delivered seminar lectures in Brazil, USA, Portugal, Tunis, Lebanon, Italy, France, Germany, South Korea, Romania, UAE and Japan. He is Consultant to Brazilian Education Ministry (CAPES), Brazilian National Research Council (CNPq) and São Paulo State Research Foundation (FAPESP). Prof. de Lemos is the Fellow of American Society of Mechanical Engineers –ASME.

Tuesday, June 4th (8:30 am – 9:30 am), Ivey BMO Auditorium

Organizational and Technical Committee Meetings

Monday, June 3rd

- Meeting of Chairs/Heads of Mechanical Engineering Departments at Canadian Universities (By invitation only)
    - 9:30 am – 2:00 pm, Room: ACEB 4405

- CSME Technical Committees' meetings (12:15 pm – 1:00 pm)
    - Advanced Energy Systems (Room: ACEB 2440)
    - Advanced Manufacturing (Room: ACEB 1410)
    - Biomechanics and Biomedical Engineering (Room: ACEB 1420)
    - Environmental Engineering (Room: SEB 1056)
    - Fluid Mechanics (Room: ACEB 1415)
    - Materials Technology (Room: SEB 2099)
    - Transportation Systems (Room: ACEB 2435)

- Meeting of the Editor and Associate Editors of CSME-Transactions (By invitation only)
    - 2:00 pm – 4:00 pm, Room: ACEB 4405

Tuesday June 4th

- 166th CSME (Outgoing) Board of Directors Meeting (By invitation only)
    - 8:30 am – 1:00 pm (Room: ACEB 4405)
- 167th CSME AGM / Board of Directors Meeting (Open to CSME members),
    - 1:30 pm – 2:00 pm (Room: ACEB 4405)
- 168th CSM (Incoming) Board of Directors Meeting (By invitation only)
    - 2:00 pm – 4:00 pm (Room: ACEB 4405)
- CFDSC Annual General Meeting
    - 1:00 pm – 2:00 pm (Room: ACEB 1410)

Wednesday June 5th

- CSME Student Chapters Workshop (By invitation only)
    - 9:00 am – 12:00 pm (Room ACEB 4405)

June 3, 2019 (Monday) - CSME TRACK

8:00 AM - 4:00 PM	**Conference Registration (Amit Chakma Engineering Building Atrium)**									
8:30 AM - 9:30 AM	**CSME-CFDSC Congress Opening Ceremony** **Plenary Session (Ivey BMO Auditorium): "Artificial Knees: Can They Benefit from New Technologies?"** **Peter Walker (New York University)**									
9:30 AM - 10:00 AM	**Coffee Break (Amit Chakma Engineering Building Atrium)**									
	Session A-1 (Advanced Manufacturing I)	**Session B-1 (Advanced Energy Systems I)**	**Session C-1 (Biomechanics I)**	**Session D-1 (Biomedical Engineering I)**	**Session E-1 (Energy Materials I)**	**Session F-1 (Heat Transfer I)**	**Session G-1 (Fluid Mechanics I)**	**Session H-1 (Micro-Nano-Technologies I)**	**Session J-1 (Materials Engineering I)**	**Session K-1 (Solid Mechanics I)**
	Session Chair: Alex Czekanski	**Session Chair: Xianguo Li**	**Session Chair: Ali Ahmadi**	**Session Chair: George Knopf**	**Session Chair: Yang Zhao**	**Session Chair: Syeda Tasnim**	**Session Chair: Paul Henshaw**	**Session Chair: Michael Boutilier**	**Session Chair: Ali Nasiri**	**Session Chair: Hamid Akbarzadeh**
	Room: ACEB 1410	**Room: ACEB 2440**	**Room: SEB 1056**	**Room: SEB 1059**	**Room: ACEB 1450**	**Room: SEB 2099**	**Room: SEB 2100**	**Room: ACEB 2435**	**Room: ACEB 1415**	**Room: ACEB 1420**
10:00 AM - 10:20 AM	**Laser Polishing and Structuring of Tooling and Functional Surface (Keynote Presentation)** Evgueni Bordatchev (National Research Council of Canada)	**Thermodynamic Modeling and Optimization of Ejector Refrigeration Systems Using Alternative Working Fluids** Aggrey Mwesigye (Ryerson University); Amir Kiamari (Ryerson University); Seth Dworkin (Ryerson University)	**Computational Modeling of Passive Ankle Exoskeleton Biomechanics** Jin Zhu (University of Ottawa); Marc Doumit (University of Ottawa)	**Multiscale Fluid Flow Analysis of Decellularized Mouse Lungs to Improve Lung Regeneration** Eric Chadwick; Mohammadali Ahmadipour; Takaya Suzuki; Golnaz Karoubi; David Romero; Cristina Amon; Thomas Waddell; Aimy Bazylak; (University of Toronto);	**Phase Inversion: A Universal Method to Create High-Loading Porous Electrodes for Energy Storage Devices** Xiaofei Yang (Western University); Xueliang Sun (Western University)	**Heat Flux Analysis of a Li-Ion Cell during Charging and Discharging Periods** Abu Raihan Siddique (University of Guelph); Shohel Mahmud (University of Guelph); S. Andrew Gadsden (University of Guelph); Bill Van Heyst (University of Guelph)	**Mechanics of Active Fluides: Fluid Mechanics Refashioned by Microorganisms (Keynote Presentation)** Hassan Peerhossaini (Western University)	**Development of BioMEMS 3D Stress/Strain Sensing Mechanism** Mohammed Kayed (University of Alberta); Amr Balbola (University of Alberta); Walied Moussa (University of Alberta)	**Novel Welding Processes and Joint Evaluation Techniques in Pipeline Construction (Keynote Presentation)** Adrian Gerlich (University of Waterloo)	**Modelling of Creep Recovery in Carbon Fiber Reinforced Polymer Composites** Spencer Cabel (University of Manitoba); Raghavan Jayaraman (University of Manitoba)
10:20 AM - 10:40 AM		**Exergy Analysis of Renewable Resources for Energy Production in Remote Communities** Mudit Nijhawan (University of Windsor); Ofelia Jianu (University of Windsor)	**Computational Investigation into Materials with Lower Stiffness for Hemiarthroplasty** Carolyn Berkmortel (University of Western Ontario); Daniel Langohr (University of Western Ontario); James Johnson (University of Western Ontario); Graham King (Saint Joesph's Healthcare)	**3D Bio-Printing of Starch-Chitosan Scaffolds for Neuron Cells** Haley Butler; Emad Naseri; Debra MacDonald; Andrew Tasker; Ali Ahmadi; (University of Prince Edward Island)	**Sulfide Solid-State Electrolyte Protection Layer In-Situ Formed on the Surface of Metallic Li for High-Performance Li Batteries** Jianwen Liang (Western University); Xueliang Sun (Western University)	**The Impacts of Exterior Surface Convective Heat Transfer Coefficients on High-Rise Building Energy Consumption** Meseret Kahsay (Western University); Girma Bitsuamlak (Western University); Fitsum Tariku (British Colombia Institute of Technology)		**Microfluidic Oil-Water Separation Using a Hydrophobic-Oleophilic Stainless Steel Membrane** Tartela Alkayyali (University of Prince Edward Island); Bradley Haltli (University of Prince Edward Island); Russell Kerr (University of Prince Edward Island); Ali Ahmadi (University of Prince Edward Island)		**Using Lime/Hemp Concrete as a Multi-Fonction Material** E. Fotsing (Polytechnique Montréal); A. Ross (Polytechnique Montréal); T. Lecompte (Université Bretagne Sud)
10:40 AM - 11:00 AM	**Innovative Strategies for Assessing the Metrological Performance of Optical 3D Scanners** Farbod Khameneifar (Polytechnique Montréal)	**A Data-Driven Thermal Fault Detection Method in Lithium-Ion Batteries** Olaoluwa Ojo (University of Ontario Institute of Technology); Xianke Lin (University of Ontario Institute of Technology); Haoxiang Lang (University of Ontario Institute of Technology)	**Artificial Intelligent Examination of DXA Image Quality for Automatic Finite Element Assessment of Hip Fracture Risk** Wanshi Yu (University of Manitoba); Yunhua Luo (University of Manitoba)	**Carbon-based pH Biosensors for Monitoring Infections** Dogan Sinar (Western University); George Knopf (Western University)	**Organic/Inorganic Composite Electrolyte for Dendrite-Free Solid-State Lithium Batteries** Hanyu Huo (Western University); Xueliang Sun (Western University)	**Experimental Investigation of a Loop Heat Pipe with a Two-Way Pressure Regulated Valve** Hooman Jazebizadeh (Carleton University); Tarik Kaya (Carleton University)	**Effect of Background Turbulence on the Evolution of and Entrainment into a Turbulent Jet** Rana Sahebjam (McGill University); Susan Gaskin (McGill University)	**Design of a High Density MEMS Membrane-Rod based Hydrophone** Tara Ahmadi (University of Windsor); Mohammed Jalal Ahamed (University of Windsor); Shahpour Alirezaee (University of Windsor)	**Experimental Characterization of Anisotropic Mechanical Properties of Extruded AA6061-T6** Matthew Bondy (University of Windsor); William Altenhof (University of Windsor); John Magliaro (University of Windsor); Morten Jensen (CertaSIM LLC)	**Molecular Dynamics Simulations of Nanoindentation - The Effect of Force-Field Choice on the Predicted Elastic Modulus** Douglas Pratt (Memorial University); Sam Nakhla (Memorial University)

11:00 AM - 11:20 AM	**Multi-Objective Optimization During Sustainable Machining of Difficult-to-Cut Materials** A. Salem (University of Ontario Institute of Technology); H. Hegab (University of Ontario Institute of Technology); A. Kishawy (University of Ontario Institute of Technology); S. Rahnamayan (University of Ontario Institute of Technology)	**Energy and Exergy Analysis of a Combined Brayton/Brayton Power Cycle with Humidification** Abdoul Kader Mossi Idrissa (Royal Military College of Canada); Kiari Goni Boulama (Royal Military College of Canada)	**Impact Location Affects Brain and Neck Strain During Football Sport** Kewei Bian (Western University); Haojie Mao (Western University)	**A Novel Microfluidic Device for Real-Time Microscopic Imaging of Endothelial Cell Responses to Laminar and Disturbed Fluid Flow** Daniel Lorusso; Kayla Soon; HristoNikolov; Jaques Milner; John de Bruyn; J. Geoffrey Pickering; S. Jeffrey Dixon; David Holdsworth; Tamie Poepping; (Western University)	**Stabilization of Solid-state Electrolyte by Atomic Layer Deposition for High Performance All-solid-state Li-S Battery** Jianneng Liang (Western University); Xueliang Sun (Western University)	**Experimental Investigation of Phase Change Material in Concrete and Bentonite-Based Thermal Energy Storage Media** Pedram Atefrad (Ryerson University); Hiep Nguyen (Ryerson University); Reza Daneshazarian (Ryerson Universtiy); Aggrey Mwesigye (Ryerson University); Seth Dworkin (Ryerson University); David Salt (Capture Technologies)	**CFD and CAA Analysis of the SD 7037 Airfoil for Low Reynolds Number Flow** Alison Zilstra (University of Waterloo); David Johnson (University of Waterloo)	**Encapsulation of Single Cells with Gelatin-Methacryloyl (GelMA) on Microfluidic Device using a Stratified Flow with Viscosity Contrast** Thu Nguyen (University of Waterloo); Sarah Chan (University of Waterloo); Evelyn Yim (University of Waterloo); Carolyn Ren (University of Waterloo)	**Failure Characterization of Heavily Cross-linked Epoxy Part I: Testing** Ahmed Elruby (Memorial University); Sam Nakhla (Memorial University)	**Wave Propagation in Anisotrpic Elastic Metamaterials with Broad Bandgaps** Zhengwei Li (University of Alberta); Huan Hu (University of Alberta); Xiaodong Wang (University of Alberta)
11:20 AM - 11:40 AM	**Machining Studies on High Silicon Content Al-Si Alloys for the Aerospace Industry** Oluwole A Olufayo (École de Technologie Supérieure); Oussama Chaieb (École de Technologie Supérieure); Victor Songmene (École de Technologie Supérieure); Mohammad Jahazi (École de Technologie Supérieure)	**Numerical Modelling of Helical Steel Piles as In-Ground Heat Exchangers for Ground-Source Heat Pumps** Sarah Nicholson (Ryerson University); Aggrey Mwesigye (Ryerson University); Seth Dworkin (Ryerson University)	**Design of a 3D Printed Knee Wearable for Biomechanical Monitoring of Locomotor Activities of Daily Living** Calvin Young (University of Guelph); Michele Oliver (University of Guelph); Karen Gordon (University of Guelph)	**Design of a Custom Bioreactor for the Dynamic Culture of Perfused Cell-Laden Alginate Scaffolds Obtained by 3D Printing** Simon Collin (Université Laval)*; André Bégin-Drolet (Université Laval); Julie Fradette (Université Laval); Cindy Hayward (Université Laval); Jean Ruel (Université Laval)	**Optimizing Porous Transport Layer Structures for Polymer Electrolyte Membrane Electrolyzers Using Stochastic and Pore Network Models** Jason Lee (University of Toronto); Aimy Bazylak (University of Toronto)	**Characterization of Transient Flow Velocities During Melting of PCM in a Uniformly Heated Circular Cavity** Kyle Teather (Western University); Kamran Siddiqui (Western University)	**Effect of Anchor Impeller Speed on Gas Dispersion in Highly Viscous non-Newtonian Fluids Using Coaxial Mixers: A Peculiar Phenomenon** Sinthuran Jegatheeswaran (Ryerson University); Farhad Ein-Mozaffari (Ryerson University)	**A Quantative Study of the Dynamic Response of Soft Tubing in a Microfluidic Context for Pressure-Driven Flow** Marie Hebert (University of Waterloo); Jan Huissoon (University of Waterloo); Carolyn Ren (Unviersity of Waterloo)	**Failure Characterization of Heavily Cross-linked Epoxy Part II: Multiscale Modeling** Ahmed Elruby Memorial University); Sam Nakhla (Memorial University)	**Multiscale Analysis of Ferroelectric Cellular Metamaterials** Jiahao Shi (McGill University); Hamid Akbarzadeh (McGill University)
11:40 AM - 12:00 PM	**Investigation of Hybrid MQL-Nano Fluid Performance When Machining Inconel 718 Super Alloy** Shakti Chauhan (University of Guelph); Abdelkrem Eltaggaz (University of Guelph); Ibrahim Deiab (University of Guelph); Khahlil Khanafer (Australian College of Kuwait); Akrum Abdul-latif (University of Paris 8)	**Economic Analysis of Off-Grid Hybrid Solar-Hydrogen Energy Systems with Energy Storage** Amin Ghobeity (Sheridan College)	**Using Kinematic Signals Features of Body-Worn Inertial Sensor For Temporal Events Detection of Locomotion** Niloufar Ahmadian (University of Alberta); Milad Nazarahari (University of Alberta); Jackie Whittaker (University of Alberta); Hossein Rouhani (University of Alberta)	**In Vitro Assessement of Aerosol Delivery via the Spiriva Respimat Soft Mist Inhaler Using the ODAPT™ Adapter with Facemask** Rym Mehri; Abubaker Alatrash; Edgar Matida; (Carleton University); Frank Fiorenze (McArthur Medical Sales Inc.)	**High-Performance All-Solid-State Li-Se and Li-SeSx Batteries** Xiaona Li (Western University); Xueliang Sun (Western University)	**Inverse Heat Transfer Application in a Scaled Model of a Power Transmission Line Tower Foundation** Daqian Zhang (Memorial university); Xili Duan (Memorial University)	**Laminar Boundary Layer Response to an Impulse Forcing by a Spanwise Array of Plasma Actuators** Hossein Khanjari (York University); Ronald Hanson (York University); Philippe Lavoie (University of Toronto)	**Reading Intraocular Pressure Non-Invasively** Angelica Campigotto (Queen's University); Robert Campbell (Queen's University); Tim Ratzlaff (Kingston Health Science Centre); Yong Jun Lai (Queen's University)	**Discrete-Element Modeling of Nacre-like Materials: Statistical Variation, Nonlinear Deformations and Fracture** Najmul Abid (McGill University); Francois Barthelat (McGill University)	**Verification and Validation of a Finite Element Model for Structural Health Monitoring of Aluminum Structures using Guided Wave Ultrasonic Testiing** Muhammad Tariq Vatao; Remon Pop-Iliev; Ghaus Rizvi; (University of Ontario Institute of Technology)
12:15 PM - 1:00 PM	**Lunch (Amit Chakma Engineering Buildling Atrium) and CSME Technical Committee Meetings**									
1:00 PM - 2:00 PM	**Plenary Session (Ivey BMO Auditorium): "Petascale Supercell Thunderstorm Simulations and New Hypothesis for Tornado Formation and Maintenance" Leigh Orf (University of Wisconsin)**									
2:00 PM - 2:30 PM	**Coffee Break (Amit Chakma Engineering Building Atrium)**									

June 3, 2019 (Monday) - CSME TRACK

	Session A-2 (Additive Manufacturing I)	Session B-2 (Advanced Energy Systems II)	Session C-2 (Engineering Analysis & Design)	Session D-2 (Biomedical Engineering II)	Session E-2 (Energy Materials II)	Session F-2 (Fluid Mechanics II)	Session G-2 (Fluid Mechanics III)	Session H-2 (Micro-Nanao-Technologies II)	Session J-2 (Materials Engineering II)	Session K-2 (Solid Mechanics II)
	Session Chair: Mohsen Mohammadi	**Session Chair: Thomas Cooper**	**Session Chair: Eric Lanteigne**	**Session Chair: Aimy Bazylak**	**Session Chair: Chandra Veer Singh**	**Session Chair: Martin Agelin-Chaab**	**Session Chair: Amir Aliabadi**	**Session Chair: Carlos Escobedo**	**Session Chair: Adrian Gerlich**	**Session Chair: Liying Jiang**
	Room: ACEB 1410	**Room: ACEB 2440**	**Room: SEB 1056**	**Room: SEB 1059**	**Room: ACEB 1450**	**Room: SEB 2099**	**Room: SEB2100**	**Room: ACEB 2435**	**Room: ACEB 1415**	**Room: ACEB 1420**
2:30 PM - 2:50 PM	**Multi-Element Slicing Approach for Intelligent Additive Manufacturing Preprocessing** Dylan Bender (University of Ontario Institute of Technology); Ahmad Barari (University of Ontario Institute of Technology)	**Natural Gas Engine Driven Heat Pump System – A Case Study of an Office Building** Farshad Kimiaghalam (Ryerson University); Altamash Baig (Ryerson University); Rakesh Kumar (Ryerson University); JuanLi Ma (Ryerson University); Alan Fung (Ryerson University)	**Dynamic Analysis and Design Optimization of an Outdoor Fitness Machine** Victor Hatai (University of Ottawa); Eric Lanteigne (University of Ottawa)	**A Novel Method to Improve Estimation of Tissue Displacement Field in Ultrasound Elastography** Niusha Kheirkhah (Western University); Ali Sadeghi-Naini (York University); Abbas Samani (Western University)	**Local and electronic structure study of black phosphorus by XAFS** Weihan Li (Western University); Minsi Li (Western University); Tsun-Kong Sham (Western University); Xueliang Sun (Western University)	**Multilayer Viscoplastic Fluid Flows in Axially Rotating Pipes** Seyed Mohammad Taghavi (Université Laval); Shan Lyu (Université Laval)	**PIV Analysis of Flow Around a Simplified Ship Hull** Jennie Flaig (University of Manitoba); Baafour Nyantekyi-Kwakye (Memorial University); Xingjun Fang (University of Manitoba); Mark Tachie (University of Manitoba)	**Quantifying the Influence of Strain Engineering on Piezoresistivity Using a Six Elements Sensing Rosette** Amr Balbola (University of Alberta); Mohammed Kayed (University of Alberta); Walied Moussa (University of Alberta)	**Moisture Effect on Mechanical Performance of Out-of-Autoclave Composite Material at Different Void Level** Afshin Bayatpour (Concordia University); Mehdi Hojjati (Concordia University)	**A New Anisotropic Elastic Metamaterial (Keynote Presentation)** Xiaodong Wang (University of Alberta)
2:50 PM - 3:10 PM	**Prospects and Challenges of Reinforcement Methodologies for 3D Printable Plastics** Aman Preet Singh; Basim El Essawi; Ali Daneji; Salman Pervaiz; (Rochester Institute of Technology - Dubai Campus); Sathish Kannan (American University of Sharjah)	**Sizing, Modeling and Analysis of a Solar Seasonal Energy Storage System for Space Heating in New Foundland** Rabbani Rasha (Memorial University); Habibur Rahaman (Memorial University); Tariq Iqbal (Memorial University)	**Experimental and Numerical Modelling of a One-Degree of Freedom Non-Smooth Mechanical System** Solène Kojtych (Polytechnique Montréal); Yann Colaïtis (Polytechnique Montréal); Elsa Piollet (Polytechnique Montréal); Alain Batailly (Polytechnique Montréal)	**Modelling of Flow-Induced Shear Stress to Predict Targeted Delivery of Cells in the Decellularized Lung** Jason Chan; Eric Chadwick; Takaya Suzuki; Golnaz Karoubi; David Romero; Cristina Amon; Thomas Waddell; Aimy Bazylak; (University of Toronto)	**Pt Single Atom Electrocatalysts by Atomic Layer Deposition for Fuel Cell Related Catalytic reactions** Lei Zhang (Western University); Xueliang Sun (Western University)	**Aspect Ratio Effects on Turbulent Flow over Forward-Backward-Facing Steps** Heath Chalmers (University of Manitoba); Baafour Nyantekyi-Kwakye (Memorial University); Xingjun Fang (University of Manitoba); Mark Tachie (University of Manitoba)	**Three-Dimensional Characterization of Bursting and Sweeping Phenomena in the Turbulent Boundary Layer** Kadeem Dennis (Western University); Kamran Siddiqui (Western University)	**Quantitative Analysis and Predictive Engineering of Self-rolling of Nanomembranes** Jun Song (McGill University)	**On the Influence of the Environmental Factors on Corrosion Behavior of 13Cr Stainless Steel Using Box-Behnken Design** Mostafa Kazemipour (Memorial University); Salar Salahi (Memorial University); Ali Nasiri (Memorial University)	
3:10 PM - 3:30 PM	**3D Printed Metamaterials of Dual/Negative Poisson's Ratio Behaviors Induced by Hierarchical Architecture** Junfeng Xiao (Western University); Dongxing Zhang (Western University)	**Investigating n-Heptane Spray Characteristics Inside the Ignition Quality Tester (IQTTM) Chamber through Temperature Variation Measurements** Osama Hmood; Edgar Matida; (Carleton University); Dave Gardiner; Luc Menard; Omar Ramadan; Aaron Wilcox; Gary Webster; (Advanced Engine Technology Ltd.)	**Experimental Measurements of Thermal Distribution of Belt Drive System: Application to Vehicle Front Engine Accessory Drives** Xingchen Liu (University of Toronto); Kamran Behdinan (University of Toronto)	**Prosthetic Foot Design – A Simplified Analytical Approach** Stephanie Gibbons (Memorial University); Sam Nakhla (Memorial University); Adam Dubrowski (Memorial University)	**3D-Printed Sulfur Cathode for Lithium Sulfur Batteries** Xuejie Gao (Western University); Xueliang Sun (Western University)	**An Exact Solution to the 3D Navier-Stokes and Applications to the Ranque-Hilsch Vortex Tube** Nolan Dyck (Western University); Anthony Straatman (Western University)	**Measuring Dynamic Contact Angles of a Droplet on Inclined Hydrophobic Surfaces with Irregular Roughness** Kewei Shi (Memorial University); Xili Duan (Memorial University); Kristin Poduska (Memorial University)	**Electroadhesive Carbon Nanotube Surfaces** Michael Boutilier (Western University); Changhong Cao; Nigamaa Nayakanti; Sanha Kim; Seyedeh Mohadeseh Taheri Mousavi; A. John Hart; (Massachusetts Institute of Technology)	**Impact of Fibre Modification on the Properties of Natural Fibre Composites** Nabeel Syed (University of Ontario Institute of Technology); Utkarsh (University of Ontario Institute of Technology); Ghaus Rizvi (University of Ontario Institute of Technology); Remon Pop-Iliev (University of Ontario Institute of Technology)	**Manipulating the Architecture of Beams for High Toughness and Strength** Ahmed Dalaq (McGill University); Francois Barthelat (McGill University)

3:30 PM - 3:50 PM	**Topology Optimization for Layered Material** Daniel Pepler (University of Toronto); Craig Steeves (University of Toronto)	**Utilizing Geothermal Looping for Thermal Regulation of an Aquaculture Pond** Mitchell Kuska (University of Western Ontario); Christopher DeGroot (Western University); Kamran Siddiqui (Western University)	**The Motion of a Curling Rock: Predictions using Ice Topography** Megan Balsdon (Western University); Jeffrey Wood (Western University))	**Detailed Finite Element Analysis of Prosthetic Foot** Amanda Ricketts (Memorial University); Sam Nakhla (Memorial University)	**Novel Cell Configurations for High-Performance Superoxide Na-O_2 Batteries** Xiaoting Lin (Western University); Xueliang Sun (Western University)	**On the Aerodynamic Performance of Tail Devices for Drag Reduction of Road Heavy Vehicles** Mohammad Saeedi (Amirkabir University of Technology); Ali Tarokh (Lakehead University); Alexander Derny (Transtex-LLC); Kefu Liu (Lakehead University)	**Darcy's Law for Moving Packed Beds** Pedro Isaza (University of Toronto); Markus Bussmann (University of Toronto); Stephen Whitaker (University of California at Davis)	**A Novel Continuous Electrophoretic PH Elution Separation Technique** Jeff Farnese (University of Waterloo)	**Thermal and Dynamic Mechanial Analysis of Biochar Filled Glassfiber Polymer Composite and Hemp-fiber Polymer Composite** Raj Dahal (University of Guelph); Bishnu Acharya (University of Prince Edward Island)	**Effect of Nonlinear Material Viscosity on the Dynamic Performance of Dielectric Elastomer Oscillators** Yuanping Li (Western university); Liying Jiang (Western University)
3:50 PM - 4:10 PM	**Anisotropy in Mechanical Properties of a Wire Arc Additive Manufactured Low Carbon Low Alloy Steel** Mahya Ghaffari (Memorial University); Alireza Vahedi Nemani (Memorial University); Mehran Rafieazad (Memorial University ; Ali Nasiri (Memorial University)	**The Effect of Couple Layout on Thermoelectric Generator Performance** Xi Wang (University of Windsor); Paul Henshaw (University of Windsor); David Ting (University of Windsor)	**An Experimental Cooling Tower Model for Performance Evaluation and 3D Airflow Measurement** Lisa Clare (University of Alberta); Marc Secanell (University of Alberta); Morris Flynn (University of Alberta); Brad Vickers (International Cooling Tower)	**A Novel Approach of Predicting Deep Brain Response Following Traumatic Brain Injury** Yanir Levy (Western University); Kewei Bian (Western University); Haojie Mao (Western University)	**Investigating the Impacts of Two-Dimensional Liquid Water Evolution in the PEM Fuel Cell Cathode Gas Diffusion Layers on Mass Transport Performance Via Equivalent Circuit Modeling and Sychrotron X-ray Radiography** Nan Ge; Pranay Shrestha; Aimy Bazylak; (University of Toronto)	**Developing More Accurate Models of Tornados through Computational Analysis of the Tornado Wind Fields Produced by Simulated Supercell Events** Niall Bannigan (Western University); Eric Savory (Western University); Leigh Orf (University of Wisconsin-Madison)	**Perfectly Subcritical Gravity Currents: Laboratory and Numerical Experiments and Two-Layer Shallow Water Solution** Mitchel Baker (University of Alberta); Morris Flynn (University of Alberta); Marius Ungarish (Technion – Israel Institute of Technology)		**Influence of Strength and Trapping Characteristics on Material Susceptibility to Hydrogen Embrittlement (HE) based on Experimental Investigations and Finite Element Analyses (FEA)** Tuhin Das; Salim Brahimi; Jun Song; Stephen Yue; (McGill University)	**The Fracture Toughness of Elastic-Plastic 3D Nanolattices** Sahar Choukir (University of Toronto); Chandra Veer Singh (University of Toronto)
4:10 PM - 4:30 PM	**Post-Printing Heat Treatment of a Wire Arc Additively Manufactured Low Carbon Low Alloy Steel** Alireza Vahedi Nemani (Memorial University); Mahya Ghaffari (Memorial University); Mehran Rafieazad (Memorial University); Ali Nasiri (Memorial University)	**Design and Modeling of MRF Impact Base Frequency Enhancement for a Piezoelectric Energy Generator** Sylvester Djokoto; Hayford Azangbebil; Martin Agelin-Chaab; (University of Ontario Institute of Technology); Egidijus Dragašius; Vytautas Jūrėnas; (Kaunas University of Technology)	**Review and Data Consolidation of Ranque Hilsch Vortex Tube** Mark Parker (Western University); Anthony Straatman (Western University)	**A New Way to Link Animal Head Kinematics to Human Head Motion** Lihong Lu (Western University); Kewei Bian (Western University); Haojie Mao (Western University)	**Highly Efficient Protection by Atomic Layer Deposition/Molecular Layer Deposition for Lithium and Sodium Metal Anode** Yang Zhao (Western University); Xueliang Sun (Western University)	**Can we limit the passenger exposure to airborne contaminants in commerical aircraft cabins during the climb leg?** Hossam Elmaghraby (University of Guelph); Yi Wai Chiang (University of Guelph); Amir Aliabadi (University of Guelph)	**A Study on Vortex Dynamics in Laminar-Turbulent Transition by a Point Cloud Model** Kazuo Matsuura (Ehime University)		**Work of Fracture in Non-Crimp Fabric Carbon Fiber Reinforced Epoxy Composites** Aaditya Suratkar (Western University); Ying Fan (Western University); John Montesano (University of Waterloo); Jeffrey Wood (Western University)	
5:00 PM - 7:30 PM	**Various Tours** **Meeting point (Amit Chakma Engineering Building Atrium)**									

June 4, 2019 (Tuesday) - CSME TRACK

8:00 AM - 4:00 PM	**Conference Registration (Amit Chakma Engineering Building Atrium)**									
8:30 AM - 9:30 AM	**Plenary Session (Ivey BMO Auditorium): "Advances in Numerical Modelling of Flow, Heat, and Mass Transfer in Heterogeneous Media" Marcelo de Lemos (Instituto Tecnológico de Aeronáutica)**									
9:30 AM - 10:00 AM	**Coffee Break**									
	Session A-3 (Advanced Manufacturing II)	**Session B-3 (Robotics, Mechatronics, Automation I)**	**Session C-3 (Biomechanics II)**	**Session D-3 (Environmental Engineering I)**	**Session E-3 (Energy Materials III)**	**Session F-3 (Heat Transfer II)**	**Session G-3 (Fluid Mechanics IV)**	**Session H-3 (Transportation Systems I)**	**Session J-3 (Materials Engineering III)**	**Session K-3 (Solid Mechanic III)**
	Session Chair: Farbod Khameneifar	**Session Chair: Mehrdad Kermani**	**Session Chair: Hossein Rouhani**	**Session Chair: Animesh Dutta**	**Session Chair: Xianke Lin**	**Session Chair: Jubayer Chowdhury**	**Session Chair: Ali Tarokh**	**Session Chair: Yuping He**	**Session Chair: Ali Nasiri**	**Session Chair: Hamid Akbarzadeh**
	Room: ACEB 1410	**Room: ACEB 2440**	**Room: SEB 1056**	**Room: SEB 1059**	**Room: ACEB 1450**	**Room: SEB 2099**	**Room: SEB 2100**	**Room: ACEB 2435**	**Room: ACEB 1415**	**Room: ACEB 1420**
10:00 AM - 10:20 AM	**Implementations and Applications of Elliptical Vibration Micro/Nano-Cutting** Nikolai Farrus (Western University); O. Remus Tutunea-Fatan (Western University); Nicolas Milliken (National Research Council of Canada); Evgueni Bordatchev (National Research Council of Canada)	**Nonlinear Model Predictive Control of Path Following by Waterloo's Autonomous Car** Mohammad Hassanpour (University of Waterloo); John McPhee (University of Waterloo); Krzysztof Czarnecki (University of Waterloo)	**Comparing Fixation Constructs for Scapula Insufficiency Fractures Following Reverse Shoulder Arthroplasty** Jason Lockhart; David Axford; G. Daniel Langohr; James Johnson; (Western University); George Athwal; Francis Ting; (St. Joseph's Health Care Foundation)	**An Airborne Thermal Imaging Methodology for Mapping Land Surface Temperature (LST) with a High Spatiotemporal Resolution** Ryan Byerlay (University of Guelph); Mohammad Biglarbegian (University of Guelph); Amir Aliabadi (University of Guelph)	**Computational Design of 2D Nanomaterials for Sustainable Energy (Keynote Presentation)** Chandra Veer Singh (University of Toronto)	**Numerical simulation of heat transfer and insulation performance of honeycomb structure** Hao Liu (University of Guelph); Syeda Tasnim (University of Guelph); William Lubitz (University of Guelph)	**A New Multivariate Correlation for Liquid/Liquid Separation** Weiwei E (Memorial University); Kevin Pope (Memorial University); Xili Duan (Memorial University)	**Multibody Dynamics in Julia** Bruce Minaker (University of Windsor)	**Additive Manufacturing of Aluminum Alloys: Opportunities for Extreme Environments (Keynote Presentation)** Mohsen Mohammadi (University of New Brunswick)	**Non-Fourier Heat Conduction and Heat Wave Interference in CNT Reinforced Composites (Keynote Presentation)** Zengtao Chen (University of Alberta)
10:20 AM - 10:40 AM	**Application of EWMA Control Chart on Volumetric Errors Change Recognition** Kanglin Xing (Polytechnique Montréal); Rene Mayer (Polytechnique Montréal); Achiche Sofiane (Polytechnique Montréal)	**Model Predictive Control, Identification and Implementation Design for a Pendubot: A Microcontroller-Based Architecture** Ricardo Bautista Quintero (University of New Brunswick); Rickey Dubay (University of New Brunswick)	**Design of a Biaxial Mechanobioreactor for Engineering Pediatric Aortic Valves** Edwin Wong (University of Toronto); Craig Simmons (University of Toronto)	**A Novel Option for City Water Recycle with Carbon Capture** Bashnu Acharya (University of Prince Edward Island); Prabir Basu (Dalhousie University); Akash Kulashreshtha (Dalhousie University)		**Performance Evaluation of Siding Materials Subjected to Radiant Heat Loads** Eder Villa Coronel (University of Alberta); Razim Refai (FPInnovations); André McDonald (University of Alberta)	**Influence of Trailing Edge Flap Pitching on Dynamic Stall in Pitching Airfoils** Farid Samara (University of Waterloo); David Johnson (University of Waterloo)	**SDP-Based Energy Management Strategy with Lithium Plating Prevention for PHEVs** Siyang Wang (University of Ontario Institute of Technology); Xianke Lin (University of Ontario Institute of Technology)		
10:40 AM - 11:00 AM	**Orthogonal Machining of Pure Magnesium-Silica Syntactic Foam** Abdulla Alhourani (American University of Sharjah); Sathish Kannan (American University of Sharjah); Salman Pervaiz (American University of Sharjah)	**A Point Cloud Generation Scheme** Shuwei Qiu (Western University); Mehrdad Kermani (Western University)	**Energy Loss of Aortic Wall in Aneurysms Predicts Tissue Delamination** Edwin Wong; Mingyi Tang; Craig Simmons; Jennifer Chung; Thomas Forbes; Jagdish Butany; Maral Ouzounian; (University of Toronto)	**Sea Lettuce to Biocarbon and Biogas with Recovery of Nutrients** Ankita Shrestha (University of Prince Edward Island); Bishnu Acharya (University of Prince Edward Island)	**Interface Engineering of Sulfide Electrolyte-Based All-Solid-State Lithium Batteries** Changhong Wang (Western University); Xueliang Sun (Western University)	**Thermal Characteristics of Steel and Composite Risers for Flow Assurance** Samar Aly (Memorial University); Sam Nakhla (Memorial University)	**System Simulation of Engine Cooling Water Jacket** Elle Mistruzzi (University of Windsor); Shankar Natarajan (FCA Canada Inc.); Ronald Barron (University of Windsor); Ram Balachander (University of Windsor)	**A Fault-Tolerant Steering Control Algorithm Using MPC for Driving Safety of All-Terrain Cranes** Kwang-seok Oh (University of Ontario Institute of Technology); Jaho Seo (University of Ontario Institute of Technology)	**Microstructural Evolution of Adiabatic Shear Bands in AZ31 Magnesium Alloy During High Strain Rate Impact** Francis Tetteh (York university); Solomon Boakye-Yiadom (York University)	**Investigating the Accuracy of Various Many-Body Potentials in Estimating Mechanical Properties of a Nanoscale Aluminum** Sabir Subedi (Memorial University); Sam Nakhla (Memorial University)

11:00 AM - 11:20 AM	**Finite Element Modeling of Fracture in Ceramic Micro-Particles During Composite Coldspray Process** Rohan Chakrabarty (McGill University); Jun Song (McGill University)	**Noise and Thermal Drift Reduction in MEMS Gyroscopes With Predictive Error Modeling and Compensation Techniques** Matthew Shamoon (University of Windsor); Mohammed Jalal Ahamed (University of Windsor)	**Mechanical Properties of the Bicipital Aponeurosis** Emmanuel Ocran (University of Guelph); Michele Oliver (University of Guelph); Karen Gordon (University of Guelph); Anne Agur (University of Toronto)	**A Vertical Diffusion Model to Predict Profiles of Temperature within the Lower Atmospheric Surface Layer: Simple or Complicated?** Mohsen Moradi; Manoj Kizhakkeniyil; Amir Nazem; Md. Rafsan Nahian; William Lubitz; Amir Aliabadi; (University of Guelph); Benjamin Dyer (McMaster University); E. Scott Krayenhoff (University of Guelph)	**High Performance 3D Li Metal Anodes Enabled by Lithiophilic Cu Nanowire Networks** Keegan Adair (Western University); Xueliang Sun (Western University)	**Thermal Management of the Hotspot on the Spray Cooled Surface Using Jet Impingement** Yakang Xia (The University of British Columbia); Ri Li (The University of British Columbia)	**A Numerical Investigation on the Fundamentally Different Mechanisms of Circular Hydraulic Jump for High and Low-Viscosity Liquids** Yunpeng Wang (Western University); Roger Khayat (Western University)	**3D Random Road Implementation in Motionview® Full Car Simulation** Zhe Ma (University of Windsor); Bruce Minaker (University of Windsor)	**Effect of Plastic Deformation on the Corrosion Behavior of 13Cr Stainless Steel** Salar Salahi (Memorial University); Mostafa Kazemipour (Memorial University); Ali Nasiri (Memorial University)	**Vibration Method for Very High Cycle Fatigue in Aluminum Alloy** M. Sentissi (Polytechnique Montréal); A. Ross (Polytechnique Montréal); M. Brochu (Polytechnique Montréal); E. Pessard (Arts et métiers ParisTech)
11:20 AM - 11:40 AM	**Global Statistics Based Method for Denoising of Planar Point Clouds** Cody Berry (University of Ontario Institute of Technology); Ahmad Barari (University of Ontario Institute of Technology)	**A Payload-Quadrotor System Modelling Analysis** Hugh Liu (University of Toronto); Longhao Qian (University of Toronto)	**Role of Medial Ligamentous Structures on PCL-Deficient Knee Kinematics During Simulated Clinical Stability Tests and Activities of Daily Living** Alireza Moslemian (Western University); Ryan Willing (Western University); Alan Getgood (Western University)	**Bio-Carbon Production by Oxidation Process of Pulp and Paper Byproducts** Zainab AL-Kaabi (University of Guelph); Naresh Thevathasan (University of Guelph); Animesh Dutta (University of Guelph); Ranjan Pradhan (University of Guelph)	**Nanomechanical Study of Atomic Layer Deposited Solid-state Electrolytes Using AFM** Maedeh Amirmaleki; Changhong Cao; Teng Cui; Yu Sun; Tobin Filleter; (University of Toronto); Biqiong Wang; Yang Zhao; Xueliang Sun; (Western University); Jaosn Tam (University of Toronto)	**The Effect of Changing the Main Compressor Inlet temperature on the Overall Cycle Efficiency for the 10 MW S-CO3 Gas Turbine Power Plant** Ibrahim Ali (Carleton University); Henry Saari (Carleton University)	**Comparison of Commonly Used Atomization Models** Siyu Chen (University of Toronto); Nasser Ashgriz (University of Toronto)	**Free Vibration Properties of Ring Gears** Jalal Taheri Kahnamouei (Memorial University); Jianming Yang (Memorial University)	**Assessing Fibre Metal Laminate Materials for their Impact Characteristics** Nicholas Tepylo (Carleton University); Bob De Snoo (Carleton University); Xiao Huang (Carleton University); Calvin Rans (Delft University of Technology)	**Time Response of a Cylindrical Fused Silica Resonator Subjected to Varying Input Angular Velocities** Yiming Luo; Mohamed Bognash; Ibrahim Gebrel; Samuel Asokanthan; (Western University); Tianliang Qu (National University of Defense Technology)
11:40 AM - 12:00 PM	**Machinability Studies of Ferritic, Austenitic and Martensitic Stainless Steels** Oluwole A Olufayo (École de Technologie Supérieure); Osama Elfasi (École de Technologie Supérieure); Victor Songmene (École de Technologie Supérieure)	**On-Line Crack Detection in High Pressure Pipelines Using Distributed PZT Sensors** Khaled M Al-Aribe (Abu Dhabi University); Abdullah Abdullah (Abu Dhabi University)	**Vibration Analysis of a Bone-Conduction Hearing Implant** Seyed Alireza Rohani (Western University); Sumit Agrawal (Western University); Hanif Ladak (Western University)	**Kinetics of Oil Uptake Using Plastic Waste** Junaid Saleem (Hamad Bin Khalifa University); Gordon McKay (Hamad Bin Khalifa University)		**Numerical Investigation of the Effects of Coke on Transport Properties in an Ethanol Fuel Cell Reformer** Precious Arku (University of Guelph); Animesh Dutta (University of Guelph)	**Plane Couette Flow of Heavy Water with Variable Viscosity** Robert L Varty (Consultant in Engineering Science)	**Fogging Simulation of Humid Air on the Surface of Windshield in Electric Car Room** Zhou Qinghui; Liyan Liu; Xiao Long; Su Yongyuan; Xi Yifan; (Beijing University of Civil Engineering and Architecture)	**Nanoindentation of WC-Co Cemented Carbides Fabricated by Selective Laser Sintering** Joseph Agyapong (York University); Alex Czekanski (York University); Soloman Boakye-Yiadom (York University)	**Dynamics of a Mono-stable Ring-based Vibratory Energy Harvester** Ibrahim Gebrel (Western University); Ligang Wang (Harbin Engineering University); Samuel Asokanthan (Western University)
12:15 PM - 1:00 PM	**Lunch (Amit Chakma Engineering Buildling Atrium)**									

June 4, 2019 (Tuesday) - CSME TRACK

1:00 PM - 2:00 PM	**Plenary Session (Ivey BMO Auditorium): "Advanced Materials for Energy Storage and Conversion: From Nano Scale to Single Atoms" Andy Sun (Western University)**									
2:00 PM - 2:30 PM	**Coffee Break (Amit Chakma Engineering Building Atrium)**									
	Session A-4 (Additive Manufacturing II)	**Session B-4 (Advanced Energy Systems III)**	**Session C-4 (Materials Engineering IV)**	**Session D-4 (Biomedical Engineering III)**	**Session E-4 (Environmental Engineering II)**	**Session F-4 (Fluid Mechanics V)**	**Session G-4 (Fluid Mechanics VI)**	**Session H-4 (Transportation Systems II)**	**Session J-4 (Materials Engineering V)**	**Session K-4 (Solid Mechanics IV)**
	Session Chair: Sathish Kannan	**Session Chair: Xianguo Li**	**Session Chair: Sam Nakhla**	**Session Chair: Reza Fotouhi**	**Session Chair: Bishnu Acharya**	**Session Chair: Prabir Basu**	**Session Chair: Xili Duan**	**Session Chair: Bruce Minaker**	**Session Chair: William Altenhof**	**Session Chair: Annie Ross**
	Room: ACEB 1410	**Room: ACEB 2440**	**Room: SEB 1056**	**Room: SEB 1059**	**Room: ACEB 1450**	**Room: SEB 2099**	**Room: SEB 2100**	**Room: ACEB 2435**	**Room: ACEB 1415**	**Room: ACEB 1420**
2:30 PM - 2:50 PM	**Accurate Estimation of Process Parameters in Fused Deposition Modeling** Hossein Gohari Bahabadi (University of Ontario Institute of Technology); Ahmad Barari (University of Ontario Institute of Technology); Hossam Kishawy (University of Ontario Institute of Technology)	**Efficient Non-Contact Steam Generation and Superheating Using Sunlight** Thomas Cooper (York University)	**Performance of Metals in Space: A Molecular Dynamics Simulation of Atomic Oxygen Impacts on Silver** Liam Morrissey (Memorial University); Stephen Handrigan (Memorial University); Sam Nakhla (Memorial University); Ali Rahnamoun (John Hopkins University)	**The Effect of Stem Fit on the Radiocapitellar Contact Mechanics of a Metallic Axisymmetric Radial Head Hemiarthroplasty: Is Loose Fit better than Rigidly Fixed** J. Szmit (Western University); G. J. W. King (Western University); J.A. Johnson (Western University); G.D.G. Langohr (Western University)	**WRF Simulations of Urban Climate: Do We Need Low or High Topographic Resolution?** Md. Rafsan Nahian (University of Guelph); Amir Nazem (University of Guelph); Mohsen Moradi (University of Guelph); Shohel Mahmud (University of Guelph); William Lubitz (University of Guelph); Amir Aliabadi (University of Guelph)	**Numerical Investigations of a Comb-Like Film-Cooling Scheme** Hao-Ming Li (Concordia University), Wahid Ghaly (Concordia University), Ibrahim Hassan (Texas A&M University at Qatar)	**Design of Passive Wind-Tunnel Grids using a Prediction Model for Turbuelnce Intensity** Dwaipayan Sarkar (Western University); Eric Savory (Western University)	**Design Analysis of an Active Trailer Steering System for Multi-Trailer Articulated Heavy Vehicles** Mutaz Keldani (University of Ontario Institute of Technology); Yuping He (University of Ontario Institute of Technology)	**Investigative Experimental Study of the Wetting Behavior of Transparent Coatings of PMMA Blends with PVC/PS/PVDF/PDMS** Wing Yi Pao (University of Ontario Institute of Technology); Remon Pop-Iliev (University of Ontario Institute of Technology); Ghaus Rizvi (University of Ontario Institute of Technology)	**Mechanical Properties of 3D Printed Primitive Shellular Materials with Metasurface** Jiahao Shi (McGill University); Hamid Akbarzadeh (McGill University); Armin Mirabolghasemi (McGill University); Gilles Desharnais (Axis Prototypes)
2:50 PM - 3:10 PM	**Effect of Printing Parameters on the Porosity of Stainless Steel Alloy 316L Using Direct Metal Laser Sintering** Ali Eliasu (York University); Aleksander Czenkanski (York University); Solomon Boakye-Yiadom (York University)	**Detailed Characterization of Novel Radiant Floor Heating and Cooling Systems** S. Shukla (Ryerson University); R. Daneshazarian (Ryerson University); A. Mwesigye (Ryerson University); SB. Dworkin (Ryerson University); J. Swift (Grip Metal Manufacturing NUCAP Industries Inc.)	**On Reliability of Thermally-Sprayed Alumina Dielectric Layers in a Multi-layered Coating-based Heating System** Morvarid Bajgiran (Concordia University); Milad Rezvani Rad (University of Alberta); André McDonald (University of Alberta); Christian Moreau (Concordia University)	**Haptic Force Feedback for a Teleoperated Sonography System** Atieh Najafi Semnani (University of Saskatchewan); Reza Fotouhi (University of Saskatchewan); QianWei Zhang (University of Saskatchewan); Haron Obaid (University of Saskatchewan); Scott Adams (University of Saskatchewan)	**Separation of Carbon dioxide from Biogas by Adsorption of Activated Carbon** Eniola Adewakun (University of Guelph); Animesh Dutta (University of Guelph)	**Mechanics of Active Fluids at a Solid-Liquid Interface: Diffusion of Synechocystis SP. PCC 6803 in Dilute Regime** Zahra Habibi (Western University); Thomas Vourc'h (Institut Curie Physico-Chimie Curie); Julien Léopoldès (Institut Langevin, Université Paris-Est); Malihe Mehdizadeh Allaf (Western University); Hassan Peerhossaini (Western University)	**Experimental Simulation of a Density-Driven Downburst Translating within an Atmospheric Boundary Layer** Shivani Jariwala (Western University); Kyle Graat (Western University); Eric Savory (Western University)	**Control-Oriented Dynamic Model of a Three-way Catalytic Converter Utilizing Orthogonal Collocation** Amer Keblawi (University of Waterloo); John McPhee (University of Waterloo)	**On Fabrication and Durability of Superhydrophobic Electrodeposited Zn Coating on Stainless Steel: the Effect of Substrate's Surface Roughness** Mona Amiriafshar (Memorial University); Xili Duan (Memorial University); Ali Nasiri (Memorial University)	**Time-Fractional Dual-Phase-Lag Heat Conduction and Transient Crack Problem in Viscoelastic Materials under Thermal Shock** Wenzhi Yang (University of Alberta); Zengtao Chen (University of Alberta)
3:10 PM - 3:30 PM	**Thermal Distribution of a Stainless Steel 316 Body-Centered Cube Packing Particle at Sintering Temperatures** Carlos Abel Rojas Dorantes (York University); Aleksander Czekanski (York University)	**Optimal Design of Li-Ion Batteries for Health-Aware Fast Charging** Xianke Lin (University of Ontario Institute of Technology); Youngki Kim (University of Michigan Dearborn)	**Determining the Liquid Window of Al-Si Coated 22MnB5 during Austenitization using Reflectivity Measurements** Cameron Klassen (University of Waterloo); Kyle Daun (University of Waterloo)	**Validation of a Temperature Sensor for Implantable Infection Telemetry** Michael Lavdas (Western University); David Holdsworth (Western University); Matthew Teeter (Western University); Brent Lanting (London Health Sciences Center)	**Eggshell-Derived Carbon Dioxide Sorbent: Calcination and Carbonation Kinetic Studies** Shakirudeen Salaudeen (University of Guelph); Animesh Dutta (University of Guelph); Bishnu Acharya (University of Prince Edward Island)	**Numerical Study on Gas–Solids Circulating Fluidized Bed Downer Reactors** Zeneng Sun (Western University); Chao Zhang (Western University)	**A Very Large-Eddy Simulation (VLES) Model for Investigation of the Thermally-Stratified Atmospheric Boundary Layer: Reductionist and Practical** Amir Aliabadi (University of Guelph); Gonçalo Pedro (RWDI)	**A Review of Active Aerodynamic Control for Increasing Safety of High-Speed Road Vehicles** Mohammed Hammad (University Of Ontario Institute Of Technology); Yuping He (University Of Ontario Institute Of Technology)	**Manufacturing Processes Over the Final Residual Stress State of Crankshafts** Luiz Fonseca (Instituto Tecnológico de Aeronáutica); Mario Batalha (Instituto de Pesquisas Tecnológicas - IPT); Alfredo de Faria (Instituto Tecnológico de Aeronáutica); Hamid Jahed (University of Waterloo)	**Investigating the Effect of Porosity and Temperature on Modulus of Nanoscale Aluminium** Sabir Subedi (Memorial University); Sam Nakhla (Memorial University)

3:30 PM - 3:50 PM	**Additively Manufactured DMLS-AlSi10Mg Using Recycled Powder: The Impacts on Microstructure and Corrosion Properties** Mehran Rafieazad (Memorial University); Abhijit Chatterjee (Memorial University); Ali Nasiri (Memorial University)	**Numerical Modeling of a Thermal Energy Storage System for Ground Source Heat Pump Applications** Hiep Nguyen (Ryerson University); Aggrey Mwesigye (Ryerson University); Pedram Atefrad (Ryerson University); Reza Daneshazarian (Ryerson Universtiy); Seth Dworkin (Ryerson University); David Salt (Capture Technologies)	**Acoustic Topological Insulators in a Flow-Free Symmetry-Broken Resonator System** Xingxing Liu (Western University); Jun Yang (Western University)	**Aortic Wall Stresses in Correlation to Potential of Rupture** Stephanie Gibbons (Memorial University); Sam Nakhla (Memorial University); Adam Dubrowski (Memorial University)	**Physics and control of landfill gas flow collection by horizontal wells** Yana Nec (Thompson Rivers University); Greg Huculak (GNH Consulting Ltd.)	**Bed Voidage Predictions for Inverse Liquid-solid Fluidized Beds** Saleh Srabet (Western University); Jesse Zhu (Western University); Dominic Pjontek (Western University)	**Experimental Investigation of an Archimedes Screw Pump** Murray Lyons (University of Guelph); Scott Simmons (University of Guelph); William Lubitz (University of Guelph)	**Comparison of Different Steering Ratios on Steering by Wire Vehicle** Huiyong Zhao (Hubei University of Automotive Technology); Baohua Wang (Hubei University of Automotive Technology); Guangde Zhang (Wuhan University of Science and Technology); Mutaz Keldani (University of Ontario Institute of Technology)	**Kinetics of Detwinning Arising from Annealing in Chemical Vapor Deposited Nickel** Hao Sun (University of Toronto); Chandra Veer Singh (University of Toronto)	**Application of the Theory of Configurational Mechanics in Soft Dielectrics** Jianyou Zhou (Western University); Liying Jiang (Western University)
3:50 PM - 4:10 PM	**Effect of Heat Treatment Holding Time on the Microstructure and Mechanical Properties of Inconel 718 Superalloy Fabricated by Selective Laser Melting** Eslam Fayed; Mamoun Medraj; (Concordia University); Davood Shahriari; Mohammad Jahazi; Vladimir Brailovski; (École de technologie supérieure)	**Through-Plane Permeability of a Successively Strained Gas Diffusion Layer in Polymer Electrolyte Membrane Fuel Cells** James Park (University of Waterloo); Jian Zhao (University of Waterloo); Xianguo Li (University of Waterloo)	**Sustainability Assessment of Machining Difficult-to-Cut Materials** A. Eltaggaz (University of Guelph); I. Deiab (University of Guelph); H. Hegab (Cairo University)	**Hemodynamics of Cerebral Aneurysms: A Computational and Experimental Study** Jacob Barrera (University of British Columbia); Han Hung Yeh (The University of British Columbia); Dana Grecov (University of British Columbia)	**Novel use of Fluent to Simulate Oxides of Nitrogen (NOx) Dispersion Downwind of an Air Pollution Barrier** David Wood (University of Guelph); Amir Aliabadi (University of Guelph); Bill Van Heyst (University of Guelph)	**Numerical Investigation of the Effect of Mid-Section Length on the Aerodynamics of the Ahmed Body** Naseeb Siddiqui (University of Ontario Institute of Technology); Martin Angelin-Chaab (University of Ontario institute of Technology)	**Effects of Varying Inclination Angle on Archimedes Screw Generator Power Production with Constant Head** Scott Simmons; Murray Lyons; William Lubitz; (University of Guelph); Guilhem Dellinger (École Nationale du Génie de l'Eau et de l'Environnement de Strasbourg)	**A Comparison of Hydraulic and Electric Trailer Steering Actuators for Articulated Heavy Vehicles** Kondavalasa Patnaik (University of Ontario Institute of Technology); Yuping He (University of Ontario Institute of Technology)	**Molecular Dynamics Investigation on the Effect of Vacancies on Young's Modulus of Pure Iron** Stephen Handrigan (Memorial University); Liam Morrissey (Memorial University); Sam Nakhla (Memorial University)	**Multiscale Synergistic Damage Mechanics Methodology for Predicting Progressive Failure of Composite Structures** Chandra Veer Singh (University of Toronto)
4:10 PM - 4:30 PM	**3D Printing of Vitrimer with Recycable and Precise In-Situ Self-Healing Properties** Mingyue Zheng (Western University); Jun Yang (Western University)			**Low-temperature 3D printing of PLGA: printability study** Emad Naseri; Haley Butler; Wyatt MacNevin; Marya Ahmed; Ali Ahmadi; (University of Prince Edward Island)	**Airflow in Narrow Street Canyons: Single or Double Vortex?** Lup Wai Chew (Massachusetts Institute of Technology); Amir Aliabadi (University of Guelph); Leslie Norford (Massachusetts Institute of Technology)	**Experimental Study of Controlling Flow Separation in Channel Expansions** Devi Thapa (D.M. Wills Associates Limited)	**Relationship between POD Modes and Physical Mechanisms in Tornado-Like Vortex** Mohammad Karami; Horia Hangan; (Western University); Luigi Carassale (University of Genova); Hassan Peerhossaini (Western University)	**Grey Wolf Optimizer for Automotive Brake–By-Wire (MRB) System Design** Adel Younis (Australian College of Kuwait); Zuomin Dong (University of Victoria); Fadi Al Khatib (Australian College of Kuwait)	**Molecular Dynamics Investigation on the Effect of Size and Temperature on Young's Modulus of Iron** Stephen Handrigan (Memorial University); Liam Morrissey (Memorial University); Sam Nakhla (Memorial University)	
4:30 PM - 5:15 PM	**NSERC Panel on Grants and Scholarships (Room: ACEB 1410)**									
6:00 PM - 9:30 PM	**Congress Banquet (Great Hall, Somerville House)** **Cash Bar (5:30 PM - 6:00 PM)**									

June 5, 2019 (Wednesday) - CSME TRACK

8:30 AM - 9:30 AM	**CSME-CFDSC Congress Closing Ceremony Plenary Session (Ivey BMO Auditorium): "Resilient Manufacturing System" Ruxu Du (South China University of Technology)**									
9:30 AM - 10:00 AM	**Coffee Break**									
	Session A-5 (Advanced Manufacturing III)	**Session B-5 (Robotics, Mechatronics, Automation II)**	**Session C-5 (Biomechanics III)**	**Session D-5 (Biomedical Engineering IV)**	**Session E-5 (Energy Materials IV)**	**Session F-5 (Heat Transfer III)**	**Session G-5 (Fluid Mechanics VII)**	**Session H-5 (Nuclear Materials)**	**Session J-5 (Materials Engineering VI)**	**Session K-5 (Wind Energy and Engineering)**
	Session Chair: Evgueni Bordatchev	**Session Chair: Farrokh Janabi-Sharifi**	**Session Chair: Ryan Willing**	**Session Chair: Ali Ahmadi**	**Session Chair: Lei Zhang**	**Session Chair: Sunny Ri Li**	**Session Chair: Tony Straatman**	**Session Chair: Hamid Abdolvand**	**Session Chair: Ben Jar**	**Session Chair: Jubayer Chowdhury**
	Room: ACEB 1410	**Room: ACEB 2440**	**Room: SEB 1056**	**Room: SEB 1059**	**Room: ACEB 1450**	**Room: SEB 2099**	**Room: SEB 2100**	**Room: ACEB 2435**	**Room: ACEB 1415**	**Room: ACEB 1420**
10:00 AM - 10:20 AM	**Axial Strategy for Ultraprecise Single Point Cutting of V-grooves with Constant Cross-Sectional Cutting Area** Delfim Joao (Western University); O. Remus Tutunea-Fatan (Western University); Nicolas Milliken (National Research Council); Evgueni Bordatchev (National Research Council)	**Design of the Mechanical Transmission for 5 DOF Robot with Distributed Active Semi-Active Actuation** Sergey Pisetskiy (Western University); Mehrdad Kermani (Western University)	**Performance of QCT-Derived Scapula Finite Element Models in Predicting Local Displacements Using Digital Volume Correlation** Jonathan Kusins; Nikolas Knowles; Louis Ferreira; (Western University); Melissa Ryan; Enrico Dall'Ara; (University of Sheffield)	**Microfluidic Droplet Transport by Photoelectrowetting** Khaled Al-Aribe (Abu Dhabi University); George Knopf (Western University)	**Interfacial Engineering of Solid-State Batteries using Atomic Layer Deposition (Keynote Presentation)** Neil P. Dasgupta (University of Michigan, Ann Arbor)	**Development of a Numerical Model for Hydrothermal Conversion of Biomass** Mohammad Heidari (University of Guelph); Animesh Dutta (University of Guelph); Bishnu Acharya (University of Prince Edward Island)	**Drag Reduction in Conduits with Vibrating Walls** Josuel Rogenski (Western University); Maciej Floryan (Western University)	**Orientation Dependent Irradiation Hardening in Pure Zr Studied by Nanoindentation, TEM, and Crystal Plasticity Finite Element Modeling** Qiang Wang; Christopher Cochrane; Travis Skippon; Zhouyao Wang; Mark Daymond; (Queen's University); Hamid Abdolvand (Western University)	**Crystal Orientation Effect on the Incipient Plasticity of the Thin Film Nanoindentation** Mahdi Bagheripoor (Western University); Robert Klassen (Western University)	**Calibration of Icing Severity Measurement on a Wind Turbine Nacelle using Image Analysis of Ice Accretions** Patrice Roberge (Université Laval); Jean Lemay (Université Laval); Jean Ruel (Université Laval); André Bégin-Drolet (Université Laval)
10:20 AM - 10:40 AM	**Effect of Tool Paths on Fine & Ultrafine Particles Emission & Distribution During Polishing of Medium Silica Content Granite** Brice Kouamou (École de technologie supérieure); Victor Songmene (École de Technologie Supérieure); Jules Kouam (École de technologie supérieure)	**Pneumatic Hyperelastic Actuators for Grasping Soft Organic Objects** Alexandre Galley (Western University); George K. Knopf (Western University)	**Material Mapping of QCT-Derived Scapular Models: A Comparison with Micro-CT Loaded Specimens using Digital Volume Correlation** Nikolas Knowles; Jonathan Kusins; Mohammadreza Faiegi; Louis Ferreira; (Western University); Melissa Ryan; Enrico Dall'Ara; (University of Sheffield)	**A Simulation on Multi-Pixel Carbon Nanotube Field Emitter for Medical Imaging** Jiayu Liu (University of Waterloo); Elahe Cheraghi (University of Waterloo); Yonghai Sun (University of Waterloo); John Yeow (University of Waterloo)		**Experimental Study of Natural Convection in a Horizontal Uniformly Heated Cylinder** Kyle Teather (Western University); Kamran Siddiqui (Western University)	**Measurement of Ice Adhesion on Stainless Steel Hydrophobic Surfaces** Sadman Rhythm (Memorial University); Kewei Shi (Memorial University); Xili Duan (Memorial University)	**A Non-Local Crystal Plasticity Finite Element Model for Simulating Irradiation Growth in α-Zirconium Polycrystals** Omid Sedaghat (Western University); Hamid Abdolvand (Western University)	**Effect of Heat Treatment on the Micro-structural Evolution and Mechanism of Wear of 3D Printed Ti6Al4V Alloys** Niyousha Azgomi (York University); Solomon Boakye-Yiadom (York University)	**A Large Eddy Simulation of Atmospheric Boundary Layer for Vertical Axis Wind Turbine Application** Maryam Zabarjad Shiraz (Concordia University); Marius Paraischivou (Concordia)
10:40 AM - 11:00 AM	**Online monitoring of built-up edge formation in turning stainless steel using acoustic emission signals** Yassmin Ahmed (McMaster University); A.F.M. Arif (McMaster University); S.C. Veldhuis (McMaster University)	**Kalman Filtering and PID Control of an Inverted Pendulum Robot** Claire Bourque (University of Guelph); Andrew Lee (University of Guelph); Elyse Hill (University of Guelph); S. Andrew Gadsden (University of Guelph); Alex Bardelcik (University of Guelph); Mohammad Biglarbegian (University of Guelph)	**Experimental Study of the Effect of Organic and Mineral Content on Bone Mechanical Properties** Ogheneriobororue Amromanoh (University of Manitoba); Yunhua Luo (University of Manitoba); Xinyi Wu (University of Manitoba)	**Wireless Telemetry Load Sensor for Orthopaedic Applications** William Anderson (Western University); Sydney Wilson (Western University); David W Holdsworth (Western University)	**Organic Polyurea Thin Film for Stable and Long-Life Lithium Metal Anode** Yipeng Sun (Western University); Tsun-Kong Sham (Western University); Xueliang Sun (Western University)	**Comparing Artificial Neural Networks (ANN) with REFPROP Software in Predicting the Carbon Dioxide (CO2) Properties as a Working Fluid for the 10 MW Gas Turbine Power Plant** Ibrahim Ali (Carleton University); Henry Saari (Carleton University)	**Analysis of Gas Dispersion in Non-Newtonian fluids with a Coaxial Mixer through Tomography and CFD and Response Surface Methodology** Maryam Jamshidzadeh (Ryerson University); Farhad Ein-Mozaffari (Ryerson University); Ali Lohi (Ryerson University)	**On the State of Thermal Residual Stresses in Zirconium: Modeling and Experimentation** Abdulla Alawadi (Western University); Hamid Abdolvand (Western University)	**Characterization of Long-Term Mechanical Performance of Polyethylene (PE) and its Pipe** Ben Jar (University of Alberta); Na Tan (University of Alberta); Yi Zhang (University of Alberta); Souvenir Muhammad (University of Alberta)	**Experimental Simulations of Large Scale Tornado-Like Vortices** Arash Ashrafi (Western University); Horia Hangan (Western University)

11:00 AM - 11:20 AM	**Analysis of Remelted Line Formation During Laser Polishing of H13 steel** Srdjan Cvijanovic (Western University); O. Remus Tutunea-Fatan (Western University); Evgueni Bordatchev (National Research Council of Canada)	**Plant Irrigation Water Sprinkler Robot** Adel Younis; Dalal Al Salahi; Ahmad AlKhudher; Hamoud AlBajian; Eissa AlFailakawi; Mohamed Ahmed; (Australian University of Kuwait)	**The Effects Of Demographics on Shoulder Shape and Density for Population-based Design of Orthopedic Implants** Pendar Soltanmohammadi (Western University); Ryan Willing (Western University)	**Finite Element Analysis of Porous Titanium Alloy Construction Matching the Mechanical Properties of Mandibular Bone: A Pilot Sudy** Khaled Hijazi; Yara K. Hosein; Haojie Mao; David Holdsworth; S. Jeffrey Dixon; Jerrold Armstrong; Amin Rizkalla; (Western University)	**Dual-layer Li_3PO_4 Coating Supported Ni-Rich Layered Cathodes for All-Solid-State Li-Ion Batteries** Sixu Deng (Western University); Xueliang Sun (Western University)	**The Effect of Geometry on the Strength, Storage and Combustion Characteristics of Biochar and Hydrochar Pellets** Trishan Deb Abhi (University of Guelph); Animesh Dutta (University of Guelph)	**Minimum Fluidization Velocity of Inverse Liquid-solid Fluidized Bed With Using Light Solid Particles** Saleh Srabet (Western University); Jesse Zhu (Western University); Dominic Pjontek (Western University)	**Plastic Deformation Evolution at a Crack Tip in Zirconium Foil** Zhouyao Wang (Queen's University); Mark Daymond (Queen's University)	**Study on the Wear behaviour of Aluminium Metal Matrix Composites Reinforced with Hexagonal Boron Nitride and Cubic Boron Nitride** Naveen Easwaran; Rohiith G.B; Sudharshan Raghunathan (Sri Sairam Engineering College); Ramanan N (Sharda Motors Industries Ltd,); Jagathish Umapathy (University of Windsor)	**Wind Loads on Low-Rise Buildings in Tornado-Like Vortices** Jubayer Chowdhury (Western University); Peter Vickery (Applied Research Associates, Inc.); Horia Hangan (Western University); Sudhan Banik (Applied Research Associates, Inc.)
11:20 AM - 11:40 AM	**Additive Manufacturing of Electroactive Polymer aAtuated Patient-Specific Arterial Phantoms Simulating Stenosis and Dilation** Benjamin Holness (Western University); Aaron Price (Western University); Tamie Poepping (Western University)		**The Effect of Short Stem Humeral Implant Varus-Valgus Position on Bone Stress Following Total Shoulder Arthroplasty** Amir Tavakoli (Western University); Kenneth Faber (Wetsern University); G. Daniel Langohr (Western University)	**Development of a Disposable Single--Nozzle Multi--material 3D Bioprinting System** Tiffany Cameron; Ben MacCallum; Emad Naseri; Ali Ahmadi; (University of Prince Edward Island)	**Ultra-Stable Anode Interface Performed by Incorporating LiF in Li_6PS_5Cl-Based Sulfide Electrolytes** Feipeng Zhao(Western University); Xueliang Sun (Western University)	**Effects of Avocado Ripeness and Extraction Temperature on Polyphenolics Yield Using Subcritical Water Extraction** Walid Mazyan; Ali Ahmadi; (University of Prince Edward Island); Elia Martin; Anja Vogt; (National Research Council); Edward Charter (BioFoodTech)	**Experimental Measurements of Cough Airflow in the Far-Field** N. Dudalski (Western University); A. Mohamed (Western University); E. Savory (Western University); S. Mubareka (Sunnybrook Research Institute)	**Depth Dependence of Indentation Stress of Helium Implanted Inconel X-750** Loabat Shojaei-Kavan (Western University); Robert Klassen (Western University)	**Effect of Graphene and Zirconia on Wear And Fracture Behaviour Of Alumina Nanocomposites** Solomon Duntu (York University); Solomon Boakye-Yiadom (York University); Mohammad Islam (King Saud University)	**Tornado-Induced Internal and External Pressures ona Low-Rise Building with Multiple Openings** Aya Kassab (Western University); Peter J. Vickery (Applied Research Associates, Inc.); Jubayer Chowdhury (Western University); Sudhan S. Banik (Applied Research Associates Inc.); Horia Hangan (Western University)
11:40 AM - 12:00 PM	**Optimizing Cutting Tool Rake and Clearance Angles based on a Simplified Cantilever Beam Model** C. Hopkins (University of Ontario Institute of Technology); M. Imad (University of Ontario Institute of Technology); A. Hosseini (University of Ontario Institute of Technology)		**Validity of the Clinician Rated Drop Vertical Jump Scale for Patients following Anterior Cruciate Ligament (ACL) Reconstruction** Morgan Jennings (Western University); Dianne Bryant (Western University); Trevor Birmingham (Western University); Alan Getgood (Western University)	**Assessing Finger Force and Grip Configuration Variability of Varioius Standard and Arthirtic Golf Grips in Individuals with and without Hand Arthritis** Sara Holland (Western University); Emily Lalone (Western University); Louis Ferreira (Western University)		**A Fast Two-Way Coupled Integral Approach for Impinging Jet Heat Transfer** Yunpeng Wang (Western University); Roger Khayat (Western University)	**Generation of Self Organized Bubble Train Flow** Aly Gadallah (Tanta University); Kamran Siddiqui (Western University)	**Synhrotron X-ray diffraction for extracting μ-level full stress tensors in three dimensions** Karim Louca (Western University); Hamid Abdolvand (Western University)	**Quantifying the Effect of Hydrogen Charging on the Microstructure of Steel using Computed Tomography Imaging** Liam Morrissey (Memorial University); Stephen Handrigan (Memorial University); Sam Nakhla (Memorial University)	**Evaluating Structural Design Loads under Thunderstrom Winds** Haitham Aboshosha (Ryerson University); Tarek Ghazal (Ryerson University); Moustafa Aboutabikh (Ryerson University)
	End of the CSME-CFDSC Congress 2019									

June 3, 2019 (Monday) - CFDSC TRACK

8:00 AM - 4:00 PM	**Conference Registration (Amit Chakma Engineering Building Atrium)**			
8:30 AM - 9:30 AM	**CSME-CFDSC Congress Opening Ceremony** **Plenary Session (Ivey BMO Auditorium): "Artificial Knees: Can They Benefit from New Technologies?"** **Peter Walker (New York University)**			
9:30 AM - 10:00 AM	**Coffee Break (Amit Chakma Engineering Building Atrium)**			
	Session L-1 **(Large Eddy Simulation)**	**Session M-1** **(Free Surface Flows)**	**Session N-1** **(Heat and Mass Transfer I)**	**Session O-1** **(Applications I)**
	Session Chair: James McDonald	**Session Chair: Olga Trichtchenko**	**Session Chair: Josuel Rogenski**	**Session Chair: Ronald Barron**
	Room: SEB 1200	**Room: SEB 2200**	**Room: SEB 2202**	**Room: SEB 3109**
10:00 AM - 10:20 AM	**Large Eddy Simulation Using the High-Order Flux Reconstruction Approach (Keynote Presentation)** Brian Vermeire (Concordia University)	**Computing Waves Under Ice** Olga Trichtchenko (Western University); Emilian Parau (University of East Anglia)	**Optimal Configuration Of Angled Rib Turbulators For Conjugate Heat Transfer Simulation** Ramin Jalali (Sharif University of Technology); Masoud Darbandi (Sharif University of Technology); Ashkan Bagherzadeh (Sharif University of Technology); Gerry Schneider (University of Waterloo)	**A Look Inside a Heart With Cardiomyopathy and Transcatheter Aortic Valve Replacement: An Imaged-Based Fluid-Structure Interaction Modeling Study** Seyedvahid Khodaei; Reza Sadeghi; Ali Emadi; (McMaster University); Zahra Motamed (McMaster University, Massachusetts Institute of Technology)
10:20 AM - 10:40 AM		**Simulations of Self-Propulsion Model Tests of a Fishing Vessel Using a Body-Force Method Coupled With a RANS Solver** Md. Ashim Ali (Memorial University); Heather Peng (Memorial University); Wei Qui (Memorial University)	**Natural Convective Heat Transfer From Two Parallel Thin Circular Vertically Spaced Axially Aligned Horizontal Isothermal Plates of Different Diameter** Patrick Oosthuizen (Queen's University)	**Patient-Specific Simulation of Coarctation Using Lattice Boltzmann Method and Lumped Parameter Modelling** Reza Sadeghi (McMaster Univeristy); Seyedvahid Khodaei (McMaster University); Zahra Motamed (McMaster University, Massachusetts Institute of Technology)
10:40 AM - 11:00 AM	**Analysis of High-Order Element Types for Implicit Large Eddy Simulation** Carlos Pereira (Concordia University); Brian Vermeire (Concordia University)	**Modelling Requirements for Dynamic Multiphase Ship Simulations** Chunhui Liu (University of Waterloo); Xiaohua Wu (Royal Military College); Kevin McTaggart (DRDC); Jean-Pierre Hickey (University of Waterloo)	**A Numerical Study of The Effect of Thin Horizontal and Vertical Adiabatic Side Extensions on Natural Convective Heat Transfer From a Downward Facing Heated Horizontal Isothermal Surface** Patrick Oosthuizen (Queen's University); Jane Paul (Queen's University)	**Validation of rhoCentralFoam for Numerical Modelling of Underexpanded Free Jets Impinging on Plates** Peter Nielsen (Western University); Christopher DeGroot (Western University); Anthony Straatman (Western University)
11:00 AM - 11:20 AM	**Stabilizing Filters for High-Order Implicit Large Eddy Simulation** Mohsen Hamedi (Concordia University); Brian Vermeire (Concordia University)	**Numerical Simulations of Two-Body Interaction in Waves** Wei Meng (Memorial University); Heather Peng (Memorial University); Wei Qiu (Memorial University)	**Surrogate Model for Predicting Real-Time Airflow and Temperature Distributions in Data Centers** Sahar Asgari (McMaster University); Peiying Tsai (McMaster University); Ishwar Puri (McMaster University); Rong Zheng (McMaster University)	**Evaluating Floc Strength Using CFD for Primary Wastewater Treatment** Brooke Remler (Western University); Christopher DeGroot (Western University)
11:20 AM - 11:40 AM	**Assessment of Error Estimators for Grid Adaptation for LES Application** Yao Jiang (McGill University); Siva Nadarajah (McGill University)	**Study of Inertial Coalescence of Droplets on a Solid Substrate Using Lattice Boltzmann Modelling** Nilesh Pawar (IIT Delhi); Supreet Bahga (IIT Delhi); Sunil Kale (IIT Delhi); Sasidhar Kondaraji (IIT Bhubaneswar)	**A Numerical Study Of Natural Convective Heat Transfer From A Two-Sided Circular Horizontal Isothermal Element Having A Linearly-Inclined Nonflat Surface** Rafiq Manna (Queen's University); Patrick Oosthuizen (Queen's University)	**Numerical Investigation of the Impact of Manufacturing Tolerences on Marine Propeller Performance** Shanqin Jin (Memorial University); Ruosi Zha (Memorial University); Heather Peng (Memorial University); Wei Qiu (Memorial University); David Hally (DRDC); Matthew Gauthier (DRDC); Bodo Gospodnetic (Dominis Engineering)
11:40 AM - 12:00 PM	**Influence of Rib Height in a Rib-Roughened Square Duct on Turbulent Flow Using Large-Eddy Simulation** Alex Czehryn (Univerisyt of Manitoba); Vahid Mahmoodi (University of Manitoba); Bing-Chen Wang (University of Manitoba)	**Performance Analysis of a Vertical Axis Hydrokinetic Turbines Array** Bayram Mohamed (University of Calgary); Artem Korobenko (University of Calgary)	**A Numerical Study of the Forced Convection Boiling of Nanofluid Refrigerant** Diana Hernández; Mateo Arango; Fernando Toapanta-Ramos; Zulamita Zapata-Benabithe; Cesar Nieto-Londoño; (Universidad Pontificia Bolivariana)	**Numerical Modeling of a Freeze Desalination Process** Ghobad Amini (American University of the Middle East); Jamal Jamali (American University of the Middle East)
12:15 PM - 1:00 PM	**Lunch (Amit Chakma Engineering Buildling Atrium) and CSME Technical Committee Meetings**			
1:00 PM - 2:00 PM	**Plenary Session (Ivey BMO Auditorium): "Petascale Supercell Thunderstorm Simulations and New Hypothesis for Tornado Formation and Maintenance"** **Leigh Orf (University of Wisconsin)**			
2:00 PM - 2:30 PM	**Coffee Break (Amit Chakma Engineering Building Atrium)**			
	Session L-2 **(Algorithms)**	**Session M-2** **(Environmental Flows)**	**Session N-2** **(Heat and Mass Transfer II)**	
	Session Chair: Brian Vermeire	**Session Chair: Haitham Aboshosha**	**Session Chair: Gerry Schneider**	
	Room: SEB 1200	**Room: SEB 2200**	**Room: SEB 2202**	
2:30 PM - 2:50 PM	**Vorticty-Based Polynomial Adaptation for Moving And Deforming Domains** Ramin Ghoreishi (Concordia University); Brian Vermeire (Concordia University)	**Mixing In The Brazil Basin** Kelly Ogden (Western University); Raffaele Ferrari (Massachusetts Institute of Technology)	**Numerical Modeling of N-Heptane Injection and Combustion in the Ignition Quality Tester With ANSYS Forte** Osama Hmood (Carleton University); Edgar Matida (Carleton University)	
2:50 PM - 3:10 PM	**Deep Neural Networks for Non-Ideal Property Evaluation in Supercritical Flows** Petro Junior Milan (Georgia Institute of Technology); Jean-Pierre Hickey (University of Waterloo); Zhaoyi Xu (Georgia Institute of Technology); Vigor Yang (Georgia Institute of Technology)	**BIM-CFD Integrated Design Process Examples For Northern Architecture** Muna Younis (Western University); Girma Bitsuamlak (Western University); Meseret Kahsay (Western University)	**Soot Formation in a Steam-Introduced Kerosene Combustor** Masoud Darbandi (Sharif University of Technology); Majid Ghafourizadeh (Sharif University of Technology); Gerry Schneider (University of Waterloo)	
3:10 PM - 3:30 PM	**Investigation of Advection-Diffusion Problems and Simulations Using the Lattice Boltzmann Method and the ArrayFire Library for High-Performance Computing on GPU** Michael Ho; Jesús Pérez; Sébastien Leclaire; Marcelo Reggio; Jean-Yves Trépanier; (Polytechnique Montréal)	**A More Reliable Estimate For External Convective Heat Transfer Coefficient From Building Surfaces in an Urban-Setting** Anwar Awol (Western University); Girma Bitsuamlak (Western University); Fitsum Tariku (British Columbia Institute of Technology)	**CFD Modelling of Flow and Heat Transfer in a Thermosyphon** Dwaipayan Sarkar (Western University); Christopher DeGroot (Western University); Eric Savory (Western University)	
3:30 PM - 3:50 PM	**Paired Explicit Runge-Kutta Schemes For Computational Aerodynamics** Siavash Nasab (Concordia University); Brian Vermeire (Concordia University)	**The Actuator Line Method For Wind Turbine Modelling Applied In A Variational Multi-Scale Framework** Michael Ravensbergen (University of Calgary); Artem Korobenko (University of Calgary)	**A New Framework For The Prediction Of Radiative Phenomena** William Morin (University of Ottawa); James McDonald (University of Ottawa)	
3:50 PM - 4:10 PM	**Improved Approximations For The Maximum-Entropy Fourteen-Moment Closure Of Gas Dynamics** Fabien Giroux (University of Ottawa); James McDonald (University of Ottawa)	**Flutter Instability of a Flat Plate Deforming With Large Amplitude to Align With the Fluid Flow** Mohammad Tari (Polytechnique Montréal); Frederick Gosselin (Polytechnique Montréal); Eric Laurendeau (Polytechnique Montréal)	**A Numerical Evaluation of Nanofluid Multiphase Flows for Different Micro-Heat Exchanger Geometries** Daniel Bahamon (Universidad Pontificia Bolivariana); César Nieto-Londoño (Universidad Pontificia Bolivariana)	
4:15 PM - 4:35 PM	**Undergraduate Poster 3-Minute Thesis Presentations (SEB 1200)**			
5:00 PM - 7:30 PM	**Various Tours** **(Meeting Point: Amit Chakma Engineering Building Atrium)**			

June 4, 2019 (Tuesday) - CFDSC TRACK

8:00 AM - 4:00 PM	**Conference Registration (Amit Chakma Engineering Building Atrium)**			
8:30 AM - 9:30 AM	**Plenary Session (Ivey BMO Auditorium): "Advances in Numerical Modelling of Flow, Heat, and Mass Transfer in Heterogeneous Media" Marcelo de Lemos (Instituto Tecnológico de Aeronáutica)**			
9:30 AM - 10:00 AM	**Coffee Break & CFDSC Undergraduate Poster Display (Amit Chakma Engineering Building Atrium)**			
	Session L-3 (Porous Media)	**Session M-3 (Turbulence I)**	**Session N-3 (Multiphase Flows I)**	
	Session Chair: Mahmoud Elhalwagy	**Session Chair: BingChen Wang**	**Session Chair: Markus Bussmann**	
	Room: SEB 1200	**Room: SEB 2200**	**Room: SEB 2202**	
10:00 AM - 10:20 AM	**Airflow Balancing of a Produce Drying Chamber Using a Porous Media Approach (Keynote Presentation)** Mahmoud Elhalwagy (Western Univeristy); Anthony Straatman* (Western University)	**Mechanism For Transition To Turbulence in a Laminar Separation Bubble on an Airfoil (Keynote Presentation)** Joshua Brinkerhoff (University of British Columbia)	**Numerical Study of Atomization Mechanisms of Laminar Liquid Jets in High-Viscous Gaseous Crossflows** Mohammad Hashemi (Concordia University); Mehdi Jadidi (Concordia University); Ali Dolatabadi (Concordia University)	
10:20 AM - 10:40 AM			**A Multi-Region CFD Model for Aircraft Ground Deicing by Liquid Spray** Sami Emez (École de Technologie Supérieure); François Morency (École de Technologie Supérieure)	
10:40 AM - 11:00 AM	**Extension of Dynamic Heat and Mass Transfer Coupling to Turbulent Flow at Fluid/Porous Interfaces of Different Permeability** Mahmoud Elhalwagy (Western Univeristy); Anthony Straatman (Western University)	**Effect of Free-Stream Turbulence on Turbulent Boundary Layers From Flat Plates** Ivian Magalhaes (Western University); Eric Savory (Western University)	**Advances and Challenges in Simulation of LNG Behavior Inside a Tank** Ehsan Tahmasebi (University of British Columbia); Aaron Stroda (University of British Columbia); Sai Pendli (University of British Columbia); Joshua Brinkerhoff (University of British Columbia)	
11:00 AM - 11:20 AM	**Modeling of Cathode Oxygen Transport in Polymer Electrolyte Membrane Fuel Cells Based on Measured Permeability and Effective Diffusivity** Jian Zhao (University of Waterloo); Xianguo Li (University of Waterloo)	**Application of Recurrence CFD to Study Mass Transport in Turbulent Vortex Shedding After a Cylinder** Sanaz Abbasi (Johannes Kepler University); Thomas Lichtenegger (Johannes Kepler University)	**Mass-Density-Based Model Using a Gaussian Moment Method for Polydisperse Multiphase Flow** James McDonald (University of Ottawa); Jarod Ryan (University of Ottawa); Lucian Ivan (Canadian Nuclear Laboratories)	
11:20 AM - 11:40 AM	**Prediction of the Overall Performance of Catalyst-Coated Particulate Filters Using a Lattice Boltzmann-Based Model** Igor Belot; David Vidal; François Bertrand; (Polytechnique Montréal); Martin Votsmeier; Barry van Setten; Robert Greiner; (Umicore); Robert Hayes (University of Alberta)	**Simulations of 3D Turbulent Flow Around a Circular Pier With a Splitter Plate** Salar Kheshtgar (Concordia University); Samuel Li (Concordia University)	**The Effects of Turbulent Models on Multiphase Flashing Flow** Tarek Nigim (University of Alberta); Lei Li (University of Alberta); Carlos Lange (University of Alberta)	
11:40 AM - 12:00 PM				
12:15 PM - 1:00 PM	**Lunch and CFDSC Annual General Meeting (ACEB 1410)**			
1:00 PM - 2:00 PM	**Plenary Session (Ivey BMO Auditorium): "Advanced Materials for Energy Storage and Conversion: From Nano Scale to Single Atoms" Andy Sun (Western University)**			
2:00 PM - 2:30 PM	**Coffee Break & CFDSC Undergraduate Poster Display (Amit Chakma Engineering Building Atrium)**			
	Session L-4 (Applications II)	**Session M-4 (Turbulence II)**	**Session N-4 (Multiphase Flows II)**	
	Session Chair: Carlos Lange	**Session Chair: Joshua Brinkerhoff**	**Session Chair: Bruno Blais**	
	Room: SEB 1200	**Room: SEB 2200**	**Room: SEB 2202**	
2:30 PM - 2:50 PM	**Numerical Investigation of the Thermodynamics Behaviors in the Central Downward Circular Tube of the 64-Element Canadian SCWR Fuel Bundle** Huirui Han (Western University); Chao Zhang (Western University)	**Numerical Study of Turbulent Heat Transfer of a Radially-Rotating Circular Pipe Flow (Keynote Presentation)** Zhao-Ping Zhang (University of Manitoba); Bing-Chen Wang* (University of Manitoba); Dao-Qi Liu (Inner Mongolia University of Technology)	**Application of a Piecewise Barotropic Equation of State in a Homogeneous Equilibrium Mixture (HEM) Cavitation Model** Saeed Rahbarimanesh (University of British Columbia); Joshua Brinkerhoff (University of British Columbia); Ioannis Karathanassis (University of London); Manolis Gavaises (University of London)	
2:50 PM - 3:10 PM	**Permeability Tensor Orientation and its Effect on Resin Transfer Molding** Anthony Sherratt (Western University); Christopher DeGroot (Western University); Anthony Straatman (Western University)		**Modification of the CFD Model Based on the Bubble Size for the Three-Phase Flow in an Inverse Fluidized Bed** Yunfeng Liu (Western University); Zeneng Sun (Western University); Chao Zhang (Western University); Jesse Zhu (Western University)	
3:10 PM - 3:30 PM	**CFD Investigation of Compressible Flow Effects on Performance Criteria of Inflow Control Devices** Jean-Luc Olsen (University of Alberta); Matthew Miersma (University of Alberta); Carlos Lange (University of Alberta)	**The Rod-Airfoil Problem: Capabilities and Limitations of Quasi-Two Dimensional Computations for Prediction of Near-Field Velocity Fluctuations** Hanieh Param (University of Windsor); Jeffrey Defoe (University of Windsor)	**CFD Simulation of Bubble Column Reactors in the Presence of Internals** Glen Dsouza (Western University); Tuntun Gaurav (Western University); Chao Zhang (Western University); Anand Prakash (Western University)	
3:30 PM - 3:50 PM	**Oblique CFD Analysis of Open-Wheel Race Car With Circuit-Tailoring Shape Optimization** Mark Lin (San Jose State University); Periklis Papadopoulos (San Jose State University)	**Large Eddy Simulation of Turbulent Flow in Ice-Covered Channels** Rui Zeng (Concordia University); Samuel Li (Concordia University)	**CFD-PBM Study of Bubble Column Reactor Integrated with Mass Transfer Calculations** Ahmed Khalil (Western University); Christopher DeGroot (Western University)	
3:50 PM - 4:10 PM	**Development of a Formula SAE Front Wing with an Emphasis on Additional Aerodynamic Devices** Davin Jankovics (OUIT); Martin Agelin-Chaab (OUIT); Ahmad Barari (OUIT)	**Simulation of Shallow Open-Channel Flow Past a Vertical Cylinder Using IDDES-VOF Approach** Subhadip Das; Vimaldoss Jesudhas; S. Abishek; Ram Balachandar; Ronald Barron; (University of Windsor)	**Numerical Study of Droplet Behavior Using Lattice Boltzmann Method** Zhe Chen (University of Alberta); Alexandra Komrakova (University of Alberta)	
4:10 PM - 4:30 PM	**Computational Studies of the Aerodynamics of a Simplified Miata MX-5** Wing Yi Pao (UOIT); Remon Pop-Iliev (OUIT); Ghaus Rizvi (OUIT); Martin Agelin-Chaab (OUIT)	**Hyperbolic Turbulence Models for Moment-Closure Solvers** Chao Yan (University of Ottawa); James McDonald (University of Ottawa)	**Novel Impeller Designs for Bioreactor Applications: CFD Analysis Of Shear Stress** Sinthuran Jegatheeswaran (Ryerson University); Farhad Ein Mozaffari (Ryerson University)	
4:30 PM - 5:15 PM	**NSERC Panel on Grants and Scholarships (Room: ACEB 1410)**			
6:00 PM - 9:30 PM	**Congress Banquet (Great Hall, Somerville House) Cash Bar (5:30 PM - 6:00 PM)**			

June 5, 2019 (Wednesday) - CFDSC TRACK

8:30 AM - 9:30 AM	**CSME-CFDSC Congress Closing Ceremony** **Plenary Session (Ivey BMO Auditorium): "Resilient Manufacturing System"** **Ruxu Du (South China University of Technology)**			
9:30 AM - 10:00 AM	**Coffee Break**			
	Session L-5 **(Aerodynamics)**	**Session M-5** **(Particulate Flows)**	**Session N-5** **(Non-Newtonian Flows)**	
	Session Chair: Chris DeGroot	**Session Chair: Alexandra Komrakova**	**Session Chair: Kelly Ogden**	
	Room: SEB 2202	**Room: SEB 2200**	**Room: SEB 3109**	
10:00 AM - 10:20 AM	**Unsteady Simulation of the Rotor Caradonna & Tung with SU2** Ahmed Mkaouar (École de Technologie Supérieure); François Morency (École de Technologie Supérieure)	**Revisting Solid-Liquid Mixing Through The Development Of An Open-Source CFD-DEM Model (Keynote Presentation)** Bruno Blais (Polytechnique Montréal)	**Numerical Simulation of the Forced Oscillations of a Wire In Newtonian and Shear-Thinning Fluids (Keynote Presentation)** Cameron Hopkins (Western Univerisy); John de Bruyn* (Western University)	
10:20 AM - 10:40 AM	**Numerical Simulation of Parallel Airfoil Vortex Interactions at Low Reynolds Number Using Detached-Eddy Simulation** Nicholas Ogrodnik (Carleton University); Edgar Matida (Carleton University)			
10:40 AM - 11:00 AM	**Hybrid Flow Control for Micro Aerial Vehicle** Ali Esmaeili (Sharif University of Technology); Masoud Darbandi (Sharif University of Technology); Gerry Schneider (University of Waterloo)	**Development of a CFD-DEM Model in Non Inertial Frame for Solid-Liquid Mixing Applications** Bastien Delacroix (Polytechnique Montréal); Bruno Blais (Polytechnique Montréal); Louis Fradette (Polytechnique Montréal); François Bertrand (Polytechnique Montréal)	**Stability Analysis Of Viscoplastic Fluids with Wall Slip Boundary Conditions** Sayed Taghavi (Université Laval); Hossein Rahmani (Université Laval)	
11:00 AM - 11:20 AM	**An Introduction to The Real Based Method for 3D Aerodynamic Analysis of the Insect Flyers at Low Reynolds Numbers** Nasim Chitsaz (University of South Australia); Natania Yap (University of South Australia); Romeo Marian (University of South Australia); Javaan Chahl (University of South Australia)	**Coupled CFD-DEM Model to Simulate Two-Particle Settlement in a Newtonian Fluid: A Grid Comparison** Fatemeh Razavi (University of Alberta); Alexandra Komrakova (University of Alberta); Carlos Lange (University of Alberta)	**Effect of Flow and Elasticity on Nematic Liquid Crystal Lubricants** Arash Nikzad (University of British Columbia); Dana Grecov (University of British Columbia)	
11:20 AM - 11:40 AM	**Numerical Study of Roundness Effect on Flow Around a Circular Cylinder** Ran Wang (University of Windsor); Shaohong Cheng (University of Windsor)	**Variational Data Assimilation Using a Polydisperse Gaussian Model for Short Range Atmospheric Dispersion Of Radionuclides** François Forgues; James McDonald; (University of Ottawa); Volodymyr Korolevych; Luke Lebel; Lucian Ivan; (Canadian Nuclear Laboratories)	**Analyzing the Effect of Rheology of Non-Newtonian Fluids in Gas Dispersion With a Coaxial Mixer Through Tomography and CFD** Maryam Jamshidzadeh (Ryerson University); Farhad Ein-Mozaffari (Ryerson University); Ali Lohi (Ryerson University)	
11:40 AM - 12:00 PM	**Large Eddy Simulation of Taylor-Couette Flow** Mohammad Mohammadi (University of British Columbia); Joshua Brinkerhoff (University of British Columbia)	**Numerical Solution of Multiphase Flow Using New High-Order Moment-Based Eulerian Methods** Andrée-Ann Dion Dallaire (University of Ottawa); François Forgues (University of Ottawa); James McDonald (University of Ottawa); Lucian Ivan (Canadian Nuclear Laboratories)		
	End of the CSME-CFDSC Congress 2019			

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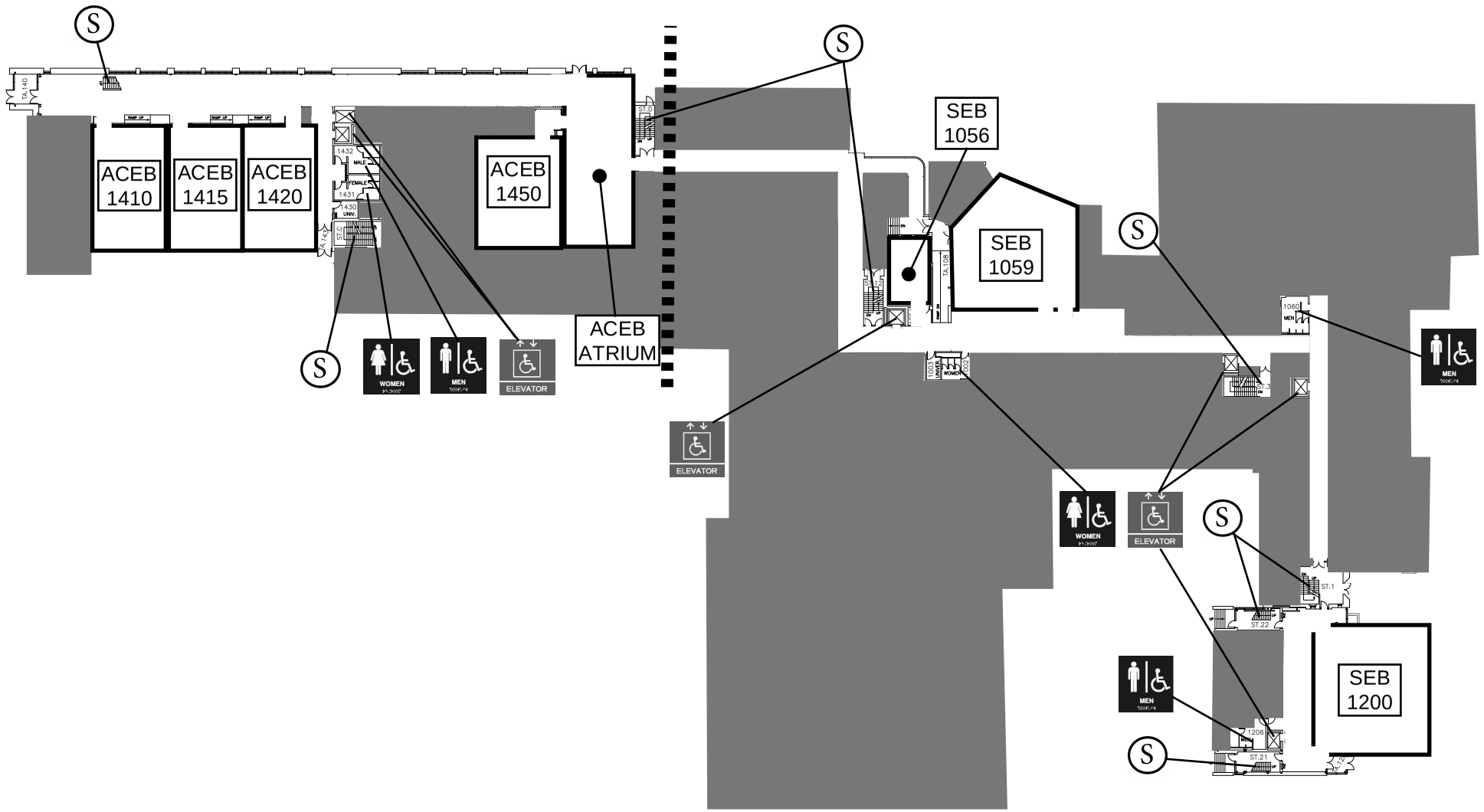

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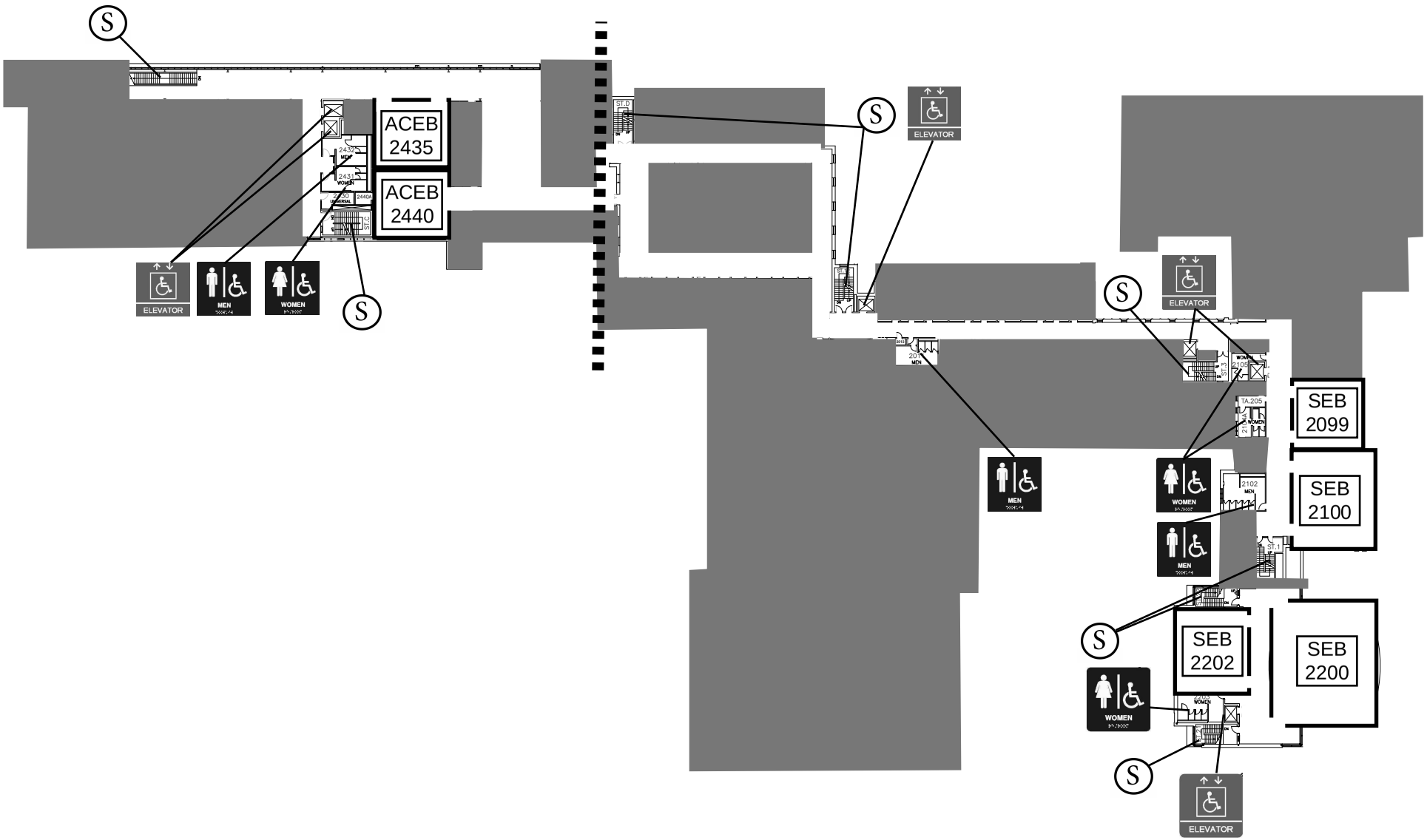

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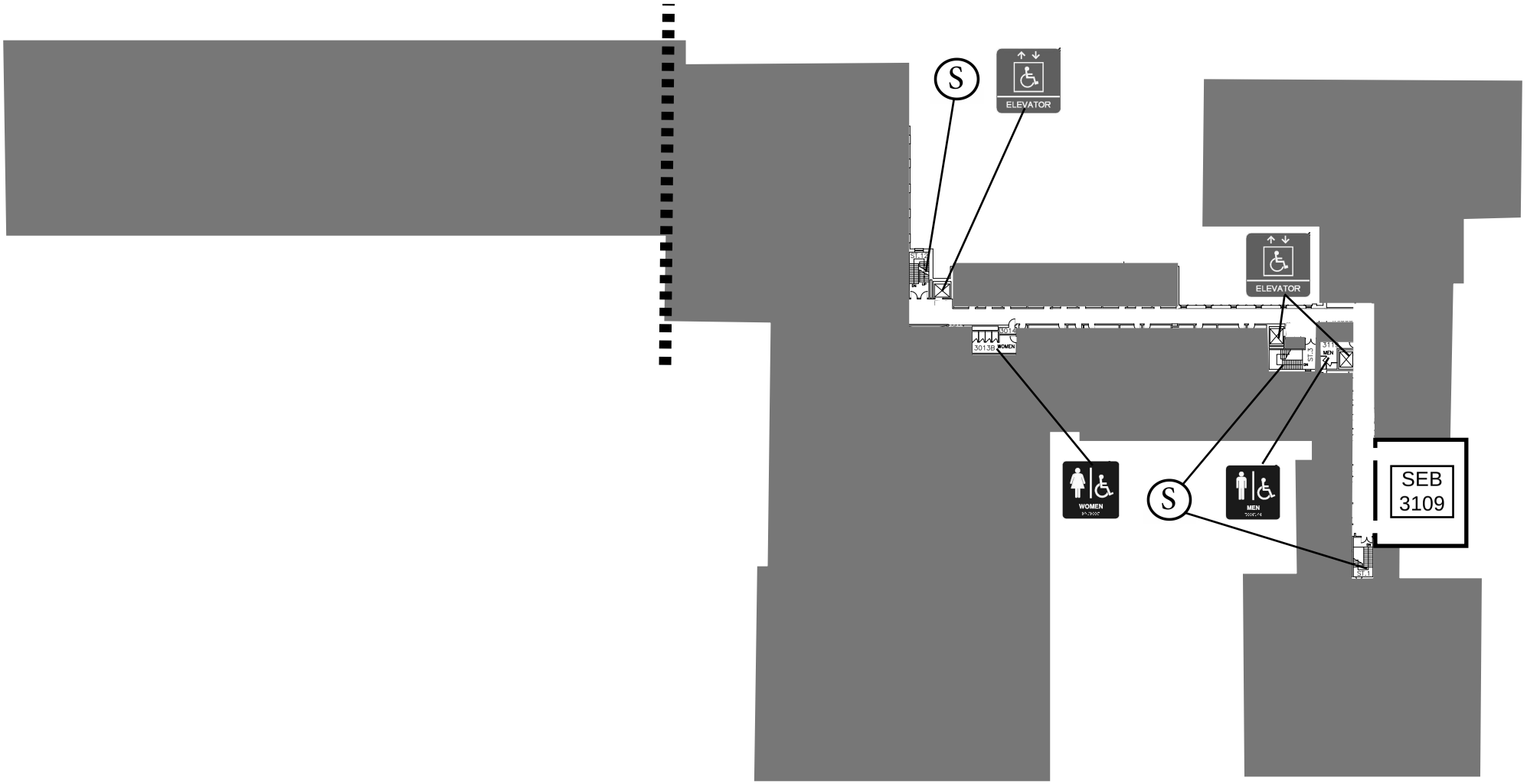

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Symposium	Organizers
Advanced Manufacturing	Alex Czekanski, Evgueni Bordatchev, Remus Tutunea-Fatan
Additive Manufacturing	Jun Yang, Tengyuan Zhang
Advanced Energy Systems	Xianguo Li
Biomechanics	Ali Ahmadi, Ryan Willing
Biomedical Engineering	George Knopf, Ali Ahmadi
Energy Materials	Yang Zhao, Keegan Adair
Engineering Analysis and Design	Kamran Behdinan
Environmental Engineering	Jubayer Chowdhury
Fluid Mechanics	Martin Agelin-Chaab, Dana Grecov
Heat Transfer	Dominic Groulx
Materials Engineering	Frank Cheng, Ali Nasiri
Mechatronics, Robotics and Automation	Farrokh Janabi-Sharifi, Mehrdad Kermani
Micro- & Nano-Technology	Carlos Escobedo
Nuclear Materials	Hamid Abdolvand
Solid Mechanics	Hamid Akbarzadeh, Liying Jiang
Transportation Systems	Yuping He
Wind Energy and Engineering	Jubayer Chowdhury, Horia Hangan

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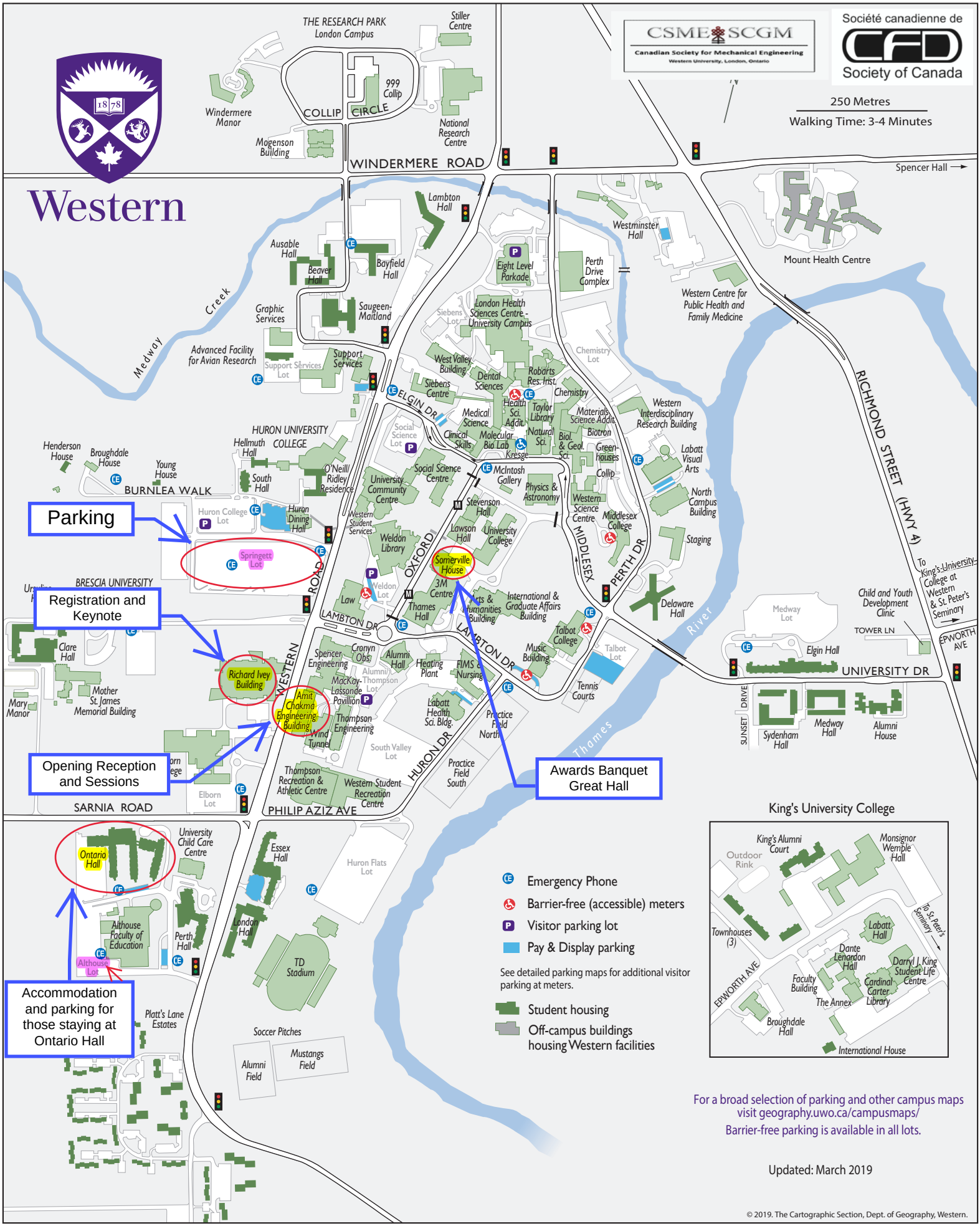
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Practice Field South
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Awards Banquet Great Hall
Thompson Recreation & Athletic Centre
Western Student Recreation Centre
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SARNIA ROAD
PHILIP AZIZ AVE
Thames River
Medway Lot
Child and Youth Development Clinic
TOWER LN
EPWORTH AVE
Elgin Hall
UNIVERSITY DR
SUNSET DRIVE
Sydenham Hall
Medway Hall
Alumni House
To King's-University-College at Western & St. Peter's Seminary
Ontario Hall
University Child Care Centre
Althouse Faculty of Education
Althouse Lot
Perth Hall
Essex Hall
London Hall
Huron Flats Lot
TD Stadium
Platt's Lane Estates
Soccer Pitches
Alumni Field
Mustangs Field
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King's Alumni Court
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