1ˢᵗ Conference on Recent Trends and Developments in Computational Science and Engineering 2023
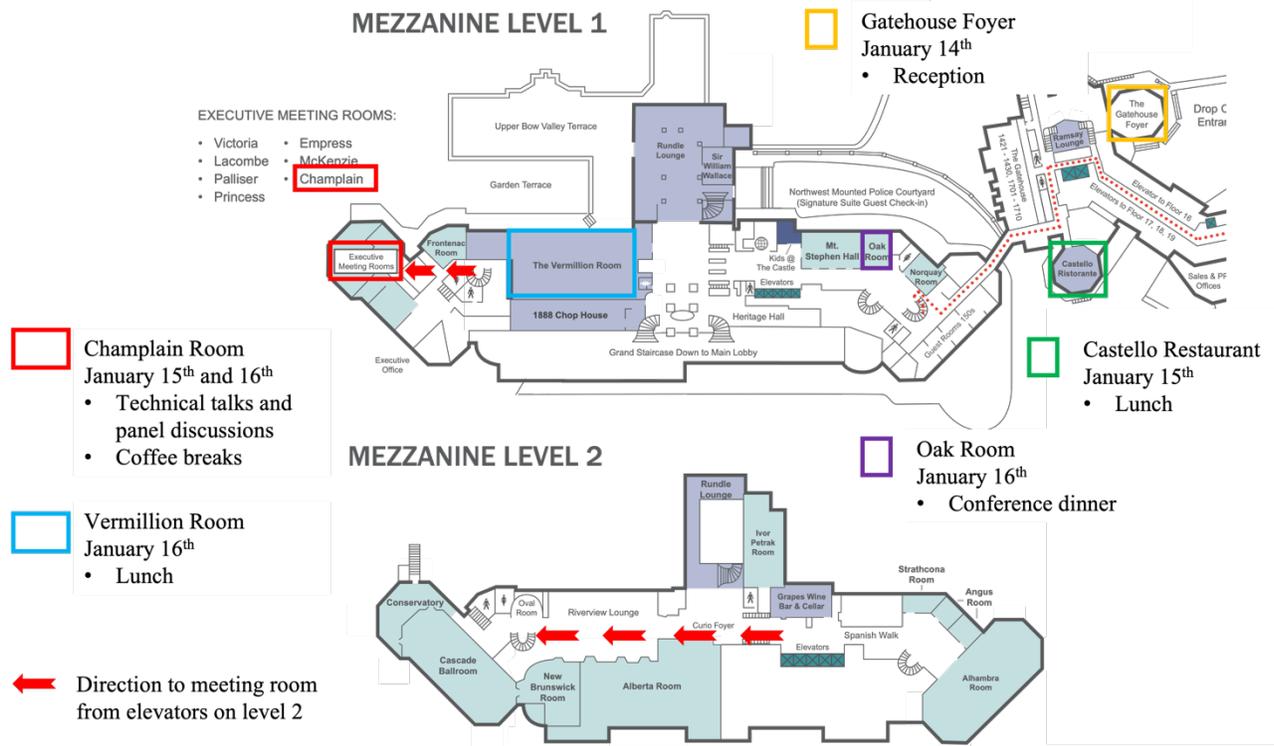
General meeting of the Canadian Association for Computational Science and Engineering (CACSE)

January 14-16, 2023
Banff, Alberta, Canada

Conference Organizing Committee

Artem Korobenko, University of Calgary
Reza Vaziri, University of British Columbia
Serge Prudhomme, Polytechnique Montréal
Robert Gracie, University of Waterloo
Marc Laforest, Polytechnique Montréal

Hotel Floor Plans

MEZZANINE LEVEL 1

EXECUTIVE MEETING ROOMS:
- Victoria
- Lacombe
- Palliser
- Princess
- Empress
- McKenzie
- Champlain

Gatehouse Foyer
January 14th
- Reception

Champlain Room
January 15th and 16th
- Technical talks and panel discussions
- Coffee breaks

Castello Restaurant
January 15th
- Lunch

MEZZANINE LEVEL 2

Vermillion Room
January 16th
- Lunch

Oak Room
January 16th
- Conference dinner

Direction to meeting room from elevators on level 2

WiFi:
- Public network available throughout the hotel
- Group network is available with passcode **CACSE.**

Registration and Reception in Gatehouse Foyer
Saturday, 6:00 – 8:00pm

Technical talks and panel discussions will take place in Champlain Room
Sunday, 8:00am – 6:00pm
Monday, 8:00am – 5:00pm

Breaks will be available in Champlain Room.

Lunch on Sunday will be available in Castello restaurant
Lunch on Monday will be available in Vermillion Room

Conference dinner in Oak Room
Monday, 6:00 – 9:00pm

Contact number: call or text 403-714-6414

Welcome to the 1st Conference on Recent Trends and Developments in Computational Science and Engineering, organized by the Canadian Association for Computational Science and Engineering (CACSE). We are happy to host our inaugural conference at the Fairmont Banff Springs Hotel in the Canadian Rockies. We bring together experts from academic institutions across Canada to discuss the most recent advances, novel applications and emerging research directions in the field of Computational Science and Engineering (CSE). The technical talks will run for 2 days (Jan. 15 - 16) with a single track. We have two panel discussions per day to discuss activities and future directions of the Association.

We are happy to see you in-person for this memorable scientific event and hope you will enjoy the technical and social part of the conference!

Conference co-chairs:

Artem Korobenko
Reza Vaziri
Serge Prudhomme
Robert Gracie
Marc Laforest

1st Conference on Recent Trends and Developments in Computational Science and Engineering

January 14-16, 2023
Fairmont Banff Springs Hotel, Banff, Canada

Saturday, January 14

6:00 – 8:00pm	Registration/Check-In, Gatehouse Foyer
6:00 – 8:00pm	Opening Reception, Gatehouse Foyer

Sunday, January 15
Champlain Room

8:30 – 9:00am	**Opening Remarks and Panel Discussion**
	Objectives and goals of the Canadian Association for Computational Science and Engineering (CACSE)

9:00 – 9:20am	**Break**

9:20 – 11:20am	**Session 1. Chair: Artem Korobenko**

9:20 – 9:40am	**Reza Vaziri,** University of British Columbia *Challenges of Micro-Polar Continuum Modelling within a Standard Finite Element Framework*
9:40 – 10:00am	**Ayhan Ince,** Concordia University *Peridynamics and machine learning-based innovative modeling approaches for material deformation and damage assessment of fatigue cracks*
10:00 – 10:20am	**Qi Zhou,** University of Calgary *High-performance computing of environmental stratified and particle flows*
10:20 – 10:40am	**Ahmad Shakibaeinia,** Polytechnique Montréal *Mesh-free particle methods for fluid mechanics: capabilities, challenges, and recent developments*
10:40 – 11:00am	**Peter Tieleman,** University of Calgary *Atomistic and coarse-grained modeling of biomolecular systems: from atoms to meso-scale*

11:00 – 12:30pm	**Lunch, Castello Restaurant**

12:30 – 2:10pm	**Session 2. Chair: Serge Prudhomme**

12:30 – 12:50pm   **Siva Nadarajah,** McGill University
Nonlinear Stability of Numerical Methods for Conservation Laws: Then, Now and the Future

12:50 – 1:10pm   **Bartosz Protas,** McMaster University
Optimal Reconstruction of Constitutive Relations in Complex Multiphysics Phenomena

1:10 – 1:30pm   **Faramarz Samavati,** University of Calgary
Global Grid System, a framework for geospatial analysis and simulation

1:30 – 1:50pm   **Eldad Haber,** University of British Columbia
Efficient Learning Regularization for the Solution of Inverse Problems

1:50 – 2:10pm   **Usman Alim,** University of Calgary
Interactive Visualization of Multivariate Scientific Data

2:10 – 2:30pm	**Break**

2:30 – 3:15pm	**Panel Discussion**
	Future directions and perspectives

3:15 – 3:40pm	**Break**

3:40 – 5:20pm	**Session 3. Chair: Reza Vaziri**

3:40 – 4:00pm   **Robert Gracie,** University of Waterloo
Coupled Problems in Geomechanics, Energy and the Environment

4:00 – 4:20pm   **Ian Frigaard,** University of British Columbia
Mechanics of Methane Leakage

4:20 – 4:40pm   **Mehdi Pouragha,** Carleton University
Discrete Element Modelling of Non-coaxial Plastic Flow in Granular Media

4:40 – 5:00pm   **Leyla Amiri,** University of Sherbrooke
Reduced order numerical models vs. 3D CFD models: Thermal Energy Storage Systems

Monday, January 16
Champlain Room

8:15 – 9:00am	**Panel Discussion**
	Future directions and perspectives

9:00 – 9:20am	**Break**

9:20 – 11:20am	**Session 4. Chair: Bartosz Protas**

9:20 – 9:40am   **Catherine Mavriplis,** University of Ottawa
h-p Adaptive High Order Methods and Direct Numerical Simulation of Transitioning Flows

9:40 – 10:00am   **Brian Vermeire,** Concordia University
Aerodynamic Shape Optimization using Large Eddy Simulation

10:00 – 10:20am   **Artem Korobenko,** University of Calgary
Stabilized and multiscale methods for fluid mechanics with finite elements and higher order NURBS discretization: application to aerospace and renewable energy applications

10:20 – 10:40am   **Bruno Blais,** Polytechnique Montréal
Open-source high-order unresolved CFD-DEM for the simulation of solid-fluid flow in chemical engineering processes

10:40 – 11:00am   **François Morency**, Ecole de Technologie Supérieure
Development of numerical methods for the CFD simulations of aircraft ground deicing

11:00 – 12:30pm	**Lunch, Vermillion Room**

12:30 – 2:10pm	**Session 5. Chair: Rajeev Jaiman**

12:30 – 12:50pm   **Marina Gavrilova,** University of Calgary
Human-centered Computing for Smart and Secure Societies of Tomorrow

12:50 – 1:10pm   **Azzeddine Soulaïmani**, Ecole de Technologie Supérieure
Deep convolutional architectures for uncertainty quantification and forecasts in flow problems

1:10 – 1:30pm   **Serge Prudhomme,** Polytechnique Montréal
On using Green's functions and neural networks for the approximation of the wave equation at high frequencies

1:30 – 1:50pm   **Emmanuel Lorin,** Carleton University
Schwarz Waveform Relaxation-Learning for Evolution PDE

1:50 – 2:10pm   **Jun Song,** McGill University
Vacancy Clustering and Hydrogen Bubbling in Structural Metals

2:10 – 2:30pm	**Break**

2:30 – 3:15pm	**Panel Discussion** *Future events and WCCM2024 organization*

3:15 – 3:40pm	**Break**

3:40 – 5:00pm	**Session 6. Chair: Robert Gracie**

3:40 – 4:00pm   **Rajeev Jaiman,** University of British Columbia
Integrated high-fidelity and data-driven modeling of fluid-structure interaction

4:00 – 4:20pm   **Frederick Gosselin,** Polytechnique Montréal
Reduced Order Modelling Approaches for Fluid-Structure Interaction in Hydraulic Turbine

4:20 – 4:40pm   **Elena Di Martino,** University of Calgary
A dynamic mesh morphing approach for CFD simulations of aortic flow with moving wall

4:40 – 5:00pm   **Duane Cronin,** University of Waterloo
Finite Element Human Body Models to Understand and Improve Vehicle Occupant Crash Safety

6:00 – 9:00	**Dinner and Closing Remark, Oak Room**