2nd Conference on Recent Trends and Developments in Computational Science and Engineering 2024

General meeting of the Canadian Association for Computational Science and Engineering (CACSE)
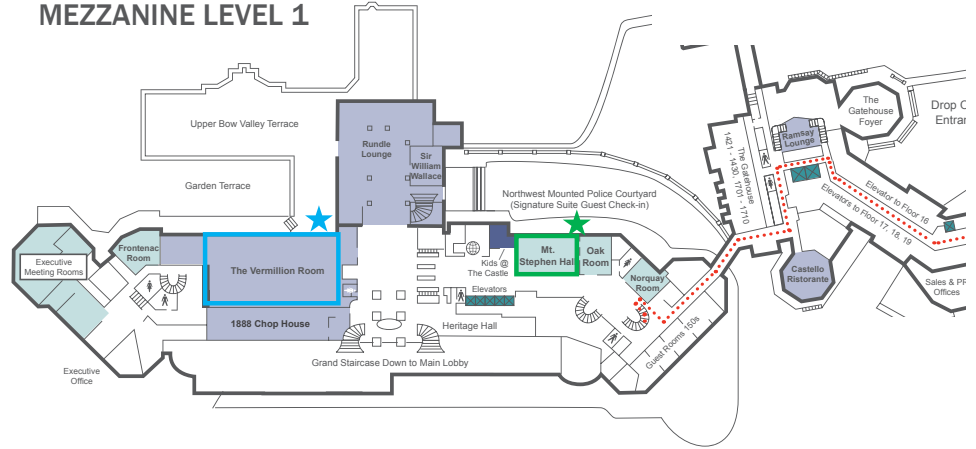
January 13-16, 2024
Banff, Alberta, Canada

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

Upper Bow Valley Terrace

Rundle Lounge

Sir William Wallace

Garden Terrace

Northwest Mounted Police Courtyard
(Signature Suite Guest Check-in)

The Gatehouse Foyer

Drop O... Entran...

Ramsay Lounge

The Gatehouse 1421 - 1430, 1701 - 1710

Elevators to Floor 16

Executive Meeting Rooms

Frontenac Room

The Vermillion Room

Kids @ The Castle

Mt. Stephen Hall

Oak Room

Norquay Room

Elevators to Floor 17, 18, 19

Castello Ristorante

Sales & PR Offices

1888 Chop House

Elevators

Heritage Hall

Guest Rooms 150s

Executive Office

Grand Staircase Down to Main Lobby

☆ Ivor Petrak Room
January 13th
- Reception
January 14th and 15th
- Technical program
- Coffee breaks
January 15th
- Dinner

☆ Vermillion Room
January 15th
- Lunch

☆ Mt. Stephen Hall
January 14th
- Lunch

MEZZANINE LEVEL 2

Rundle Lounge

Ivor Petrak Room ☆

Strathcona Room

Angus Room

Conservatory

Oval Room

Riverview Lounge

Grapes Wine Bar & Cellar

Spanish Walk

Curio Foyer

Elevators

Cascade Ballroom

New Brunswick Room

Alberta Room

Alhambra Room

WiFi:
Public network available throughout the hotel

Registration and Reception in Ivor Petrak Room
Saturday, 6:00pm – 8:00pm

Technical program in Ivor Petrak Room
Sunday, 8:30am – 4:30pm
Monday, 8:30am – 4:30pm

Breaks will be provided in Ivor Petrak Room foyer.

Lunch on Sunday will be provided in Mt. Stephen Hall
Lunch on Monday will be provided in Vermillion Room

Conference dinner in Ivor Petrak Room
Monday, 6:30pm – 9:00pm

Contact number: call or text 403-714-6414 (Artem)

Welcome to the 2nd 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. 14 - 15) with a single track. We have also panel discussions 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

2nd Conference on Recent Trends and Developments in Computational Science and Engineering

January 13-16, 2024
Fairmont Banff Springs Hotel, Banff, Canada

Saturday, January 13

6:00 – 8:00pm	Registration/Check-In, Ivor Petrak Room
6:00 – 8:00pm	Opening Reception, Ivor Petrak Room

Sunday, January 14
Ivor Petrak Room

8:00 – 8:30am	**Coffee**

8:30 – 8:40am	**Opening Remark**

8:40 – 10:00am	**Session 1. Chair: Artem Korobenko**

8:40 – 9:00am	**Serge Prudhomme,** Polytechnique Montréal *Accurate Approximations of Boundary-Value Problems using Multi-level Neural Network*
9:00 – 9:20am	**Hari Simha,** University of Guelph *Data-Driven Methods for Linear and Non-Linear Problems in Mechanics*
9:20 – 9:40am	**Robert Gracie,** University of Waterloo *Reduced order models for nonlinear path dependent problems*
9:40 – 10:00am	**Peter Tieleman,** University of Calgary *Machine learning in molecular simulations*

10:00 – 10:30am	**Coffee**

10:30 – 11:50am	**Session 2. Chair: Bartosz Protas**

10:30 – 10:50am	**Bruno Blais,** Polytechnique Montréal *Towards high-order stabilized matrix-free FEM for incompressible flows*
10:50 – 11:10am	**Siva Nadarajah,** McGill University *A New Paradigm for Shock Capturing in High-Order Methods: The Full-Space Approach*
11:10 – 11:30am	**Artem Korobenko,** University of Calgary *Modeling smooth-body flow separation with VMS and NURBS*
11:30 – 11:50am	**François Morency,** Ecole de Technologie Supérieure *Data-driven Roughness Estimation for Glaze Ice Accretion Simulation*

11:50 – 1:20pm	**Lunch, Mt Stephen Hall**

1:20 – 2:40pm	**Session 3. Chair: Robert Gracie**

1:20 – 1:40pm	**Reza Vaziri**, University of British Columbia *Characterization of progressive damage models for composites using machine learning methods*
1:40 – 2:00pm	**Blaise Bourdin**, McMaster University *Phase-field models of fracture*
2:00 – 2:20pm	**Katerina Papoulia**, York University *Lessons from cohesive modeling of quasibrittle fracture*
2:20 – 2:40pm	**Duane Cronin**, University of Waterloo *Finite Element Methods to Assess Hard Tissue Fracture and Post Fracture Response*

2:40 – 3:10pm	**Break**

3:10 – 4:30pm	**Session 4. Chair: Serge Prudhomme**

3:10 – 3:30pm	**Eldad Haber**, University of British Columbia *PDE's and Graph Neural Network*
3:30 – 3:50pm	**Bruno Savard**, Polytechnique Montréal *Direct numerical simulation of combustion for advanced gas turbines*
3:50 – 4:10pm	**Brian Vermeire**, Concordia University *Non-Linearly Stable Relaxation-Free Runge-Kutta Schemes*
4:10 – 4:30pm	**Alexandre Ern**, ENPC & INRIA Paris *Invariant-domain-preserving explicit Runge-Kutta and IMEX schemes*

Monday, January 15
Ivor Petrak Room

8:00 – 8:40am	**Coffee**

8:40 – 10:00am	**Session 5. Chair: Brian Vermeire**

8:40 – 9:00am	**Rajeev Jaiman**, University of British Columbia *New Frontiers in Fluid-Structure Interactions: CFD + FEA with Graph Neural Networks*
9:00 – 9:20am	**Peter Minev**, University of Alberta *Splitting schemes for incompressible fluid-structure interaction problems in a stress formulation*

9:20 – 9:40am	**Frédérick Gosselin**, Polytechnique Montréal *Coupling CFD Data and Vibroacoustic Modes into a Fluid-Structure Interaction ROM with POD and PINNs*
9:40 – 10:00am	**Raymond Spiteri**, University of Saskachewan *Improving resource utilization and fault tolerance in large simulations via actors*
10:00 – 10:30am	**Coffee**
10:30 – 11:50am	**Session 6. Chair: Rajeev Jaiman**
10:30 – 10:50am	**Bartosz Protas**, McMaster University *Searching for Singularities in Navier-Stokes Flows Using Variational Optimization Methods*
10:50 – 11:10am	**Marina Gavrilova**, University of Calgary *Trustworthy and reliable AI for autonomous system decision making*
11:10 – 11:30am	**Masayuki Yano**, University of Toronto *Rapid and reliable solution of parametrized PDEs: model reduction with applications to aerodynamics*
11:30 – 11:50am	**Faramarz Samavati**, University of Calgary *Partition of Unity Parametrics: A NURBS Generalization Framework for Meta-Modeling*
11:50 – 1:20pm	**Lunch, Vermillion Room**
1:20 – 2:40pm	**Session 7. Chair: Reza Vaziri**
1:20 – 1:40pm	**Ahmad Shakibaeinia**, Polytechnique Montréal *Mesh-free particle methods for multiphysics problems*
1:40 – 2:00pm	**Fabian Denner**, Polytechnique Montréal *Fully-coupled implicit finite-volume algorithm for viscoelastic flows*
2:00 – 2:20pm	**Ian Frigaard**, University of British Columbia *Squeeze cementing: coping with uncertainty in computing the sealing of well leakage*
2:20 – 2:40pm	**Yong Li**, University of Alberta *Computational Development to Support Risk-informed Decision Making for Civil Structures & Energy Infrastructure*
2:40 – 3:10pm	**Break**
3:10 – 4:30pm	**Panel discussion: Future direction and perspectives**
6:30 – 10:00pm	**Dinner and Closing Remark, Ivor Petrak Room**