Centre d'études interuniversitaire des structures sous charges extrêmes
CEISCE

A strategic research cluster dedicated to the safety of civil engineering structures subjected to extreme effects induced by natural hazards, climate change and human activities

Program - Colloquium - November 25, 2024 – Université de Sherbrooke

8 h 00 – 9 h 00 : Reception and set-up of posters

Coffee and pastries.

9 h 00 – 9 h 15 : Welcoming remarks

Prof. Najib Bouaanani, Director of CEISCE.

9 h 15 – 10 h 30 : Keynote presentation – Invited speaker

Computational frameworks to integrate disciplines and advance resilience to natural hazards: Infrastructure systems and regional coastal risk management – by **Professor Rachel Davidson**

Dr. Rachel Davidson, Professor at University of Delaware Newark, and Director of Coastal Hazards, Equity, Economic prosperity, and Resilience (CHEER) Hub, will address computational frameworks, which link multiple mathematical models to address a particular challenge, and how they can be used to integrate disciplinary perspectives and advance resilience to natural hazards. The presentation includes two examples of such computational frameworks. The first is a computational framework that can be used to conduct probabilistic risk analysis of an infrastructure system in terms of societal impact. The second part will introduce the Stakeholder-based Tool for the Analysis of Regional Risk (STARR), a dynamic, stochastic computational framework designed to inform the creation and analysis of government policies for regional disaster risk management. More details can be found in the attached abstract of the presentation.

10 h 30 – 11 h 00 : Break and posters session

Coffee break and exhibition of posters by CEISCE members.

11 h 00 – 12 h 00 : Presentations by CEISCE members

- **Wang A., Pulatsu B., Andrews S., Malomo D.** McGill University – *Videogame-inspired seismic collapse analysis of old masonry structures.*
- **Potsis T., Stathopoulos T.** Concordia University – *Design criteria for wind loads on buildings in Canada: Review of current Code provisions, wind tunnel data, and CFD results.*
- **Tavakoli S., Shakibaeinia A., Bouaanani N.** Polytechnique Montréal – *Enhancing numerical modelling of flood-induced fluid-structure interaction using the moving particle semi-implicit (MPS) method.*
- **Verma P., Dahboul S., Li L., Dey P., Boissonnade N.** Université Laval & Université de Sherbrooke – *Experimental investigations on buckling behaviour of aluminum sections and members with I and H cross-sectional shapes.*

12 h – 13 h 30 : Lunch and posters session

Lunch and exhibition of posters by CEISCE members.

13 h 30 – 14 h 45 : Presentations by CEISCE members

- **Mirfakhar S. F., Snaiki R.** École de technologie supérieure – *Wind pressure analysis and reconstruction around buildings: A multiresolution dynamic mode decomposition approach with constrained optimal sensor placement.*
- **Fatolazadeh F., Goïta K.** Université de Sherbrooke – *Innovative Reconstruction of Groundwater Storage Changes from Satellite Observations.*
- **Islam K., Tremblay R., Stojadinovic B., Alam M. S.** Polytechnique Montréal – *Finite element simulation of the lateral cyclic response of rocking steel bridge bent with curved base.*
- **Ibrahim M. Z., Meguid M. A., Chouinard L. E.** McGill University – *Comprehensive probabilistic analysis of rock slope stability in hydro power projects.*
- **Sakib F. A., Stathopoulos T., Bhowmick A. K.** Concordia University – *Wind-induced loads on canopies attached to building walls.*

14 h 45 – 15 h 15 : Break and posters session

Coffee break and exhibition of posters by CEISCE members.

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15 h 15 – 16 h 30 : Presentations by CEISCE members

- **Chen S., Xie Y.** McGill University – *Regional seismic loss assessment of the bridge network in Los Angeles.*
- **Amiri S., Koboevic S.** Polytechnique Montréal – *A probabilistic methodology for evaluating the safety of mainshock-damaged structures subjected to aftershocks.*
- **Ghaffarian Dallali E., Dey P., Chouinard L. E.** Université Laval & McGill University – *Characterizing human-induced excitations in lightweight pedestrian bridges.*
- **Joseph R., Ben Amor M., Langlois S.** Université de Sherbrooke – *Comparaison des impacts environnementaux potentiels des pylônes en aluminium et en acier dans le transport d'électricité au Québec.*
- **Berile N. K., Bezabeh M. A.** McGill University – *Performance-based wind design of tall mass timber buildings with rocking post-tensioned cross-laminated timber shear walls.*

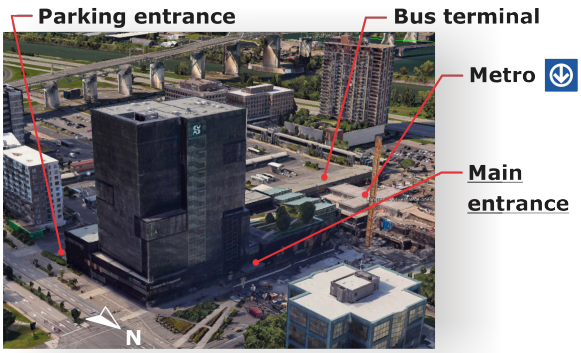
16 h 30 – 17 h 00 : Break and voting period

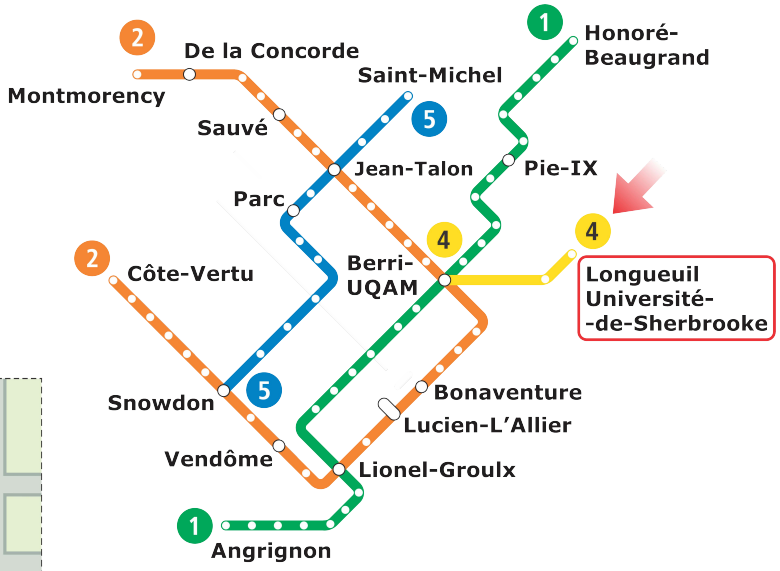
Coffee break and voting period for best student presentations and posters.

17 h 00 – 17 h 30 : Awards and closing ceremony

Awards for best presentations and posters, and closing remarks by Prof. Najib Bouaanani, Director of CEISCE.

Access - Colloquium - November 25, 2024 – Université de Sherbrooke





Présentation principale | Keynote Presentation

Computational frameworks to integrate disciplines and advance resilience to natural hazards: Infrastructure systems and regional coastal risk management

Conférencière | Speaker

Dr. Rachel Davidson

Donald C. Phillips Professor of Civil and Environmental Engineering

PI & Director of Coastal Hazards, Equity, Economic prosperity, and Resilience (CHEER) Hub

Core Faculty Member, Disaster Research Center

University of Delaware Newark, USA

Date

25 Nov. 2024

Horaire | Time

9:15 - 10:30

Local | Room

2605 & 2610
Campus de Longueuil
Université de Sherbrooke

Résumé | Abstract

Computational frameworks, which link multiple mathematical models to address a particular challenge, can be a powerful tool to integrate disciplinary perspectives and advance resilience to natural hazards. This presentation will include two examples of such computational frameworks. The first is a computational framework that can be used to conduct probabilistic risk analysis of an infrastructure system in terms of societal impact. The framework is designed to be computationally efficient, allowing all the necessary modules — hazard, physical component damage, system functioning, service restoration, and societal impact — to be combined in a scenario-based probabilistic analysis. The framework is implemented for the case of household impacts of earthquake risk to the water supply and electric power systems. Specifically, we measure societal impact in terms of implementation of household adaptations and unhappiness. A case study for Los Angeles, California illustrates how it works. The second part of the presentation will introduce the Stakeholder-based Tool for the Analysis of Regional Risk (STARR), a dynamic, stochastic computational framework designed to inform the creation and analysis of government policies for regional disaster risk management. STARR consists of seven interacting modules. Three describe the decision-making of, respectively, government agencies, insurers, and households; and four describe the natural, built, and economic environments in which those decisions are made. The tool is intended to: (1) support policy-making by facilitating development and evaluation of possible disaster risk management policies; and (2) facilitate understanding of the dynamic system of regional disaster risk management, including interactions among stakeholder actions. While it is possible to extend the framework to consider other hazards and stakeholders, STARR currently focuses on hurricanes and on households/housing.

Brève biographie | Short biography

Rachel Davidson is the Donald C. Phillips Professor of Civil Engineering, and a core faculty member in the Disaster Research Center at the University of Delaware. She is also the Principal Investigator and Director of the NSF-funded Coastal Hazards, Equity, Economic prosperity, and Resilience (CHEER) Hub. She is a Fellow and Past-President of the Society for Risk Analysis and winner of the ASCE Charles Martin Duke Lifeline Earthquake Engineering Award (2019). Davidson conducts research on natural disaster risk modeling and civil infrastructure systems. Her work involves developing new engineering models to better characterize the impact of future natural disasters and use that understanding to support decisions to help reduce future losses. It focuses particularly on lifelines (e.g., electric power, water supply) and risk from a regional perspective; on earthquakes and hurricanes.