

November 29, 2019
1:30 pm- 2:30 pm Room 3124 Mackenzie

The aerodynamic behaviour of cable-stayed bridges in dry, rainy, and iced conditions

The Aerodynamics Laboratory at the National Research Council (NRC) has been doing work in the field of bridge cable aerodynamics for more than 20 years. While few in number, the existing cable-stayed bridges in Canada represent major municipal and national connections. New, large cable-stayed bridges under development in Canada include the new Champlain Bridge in Montreal (expected to carry 100,000 vehicles per day) and the recently-announced Gordie Howe Bridge connecting Windsor and Detroit (which will have the longest main span of any cable-stayed bridge in North America). Bridge stay cables are susceptible to wind-induced vibrations in dry, rainy, or iced conditions and the effects of ice on stay cable vibrations, in particular, are not fully understood.

The NRC has undertaken a multi-year initiative to acquire the knowledge necessary to evaluate and update bridge design guidelines in a way that incorporates the effects of a changing climate. The seminar will present an overview of the novel test facilities and outcomes resulting from the investigation. The development of an improved understanding of stay cable aerodynamics leveraged research on static cable models in the NRC 2 m x 3 m wind tunnel, dynamic cable tests in the NRC 3 m x 6 m wind tunnel in dry conditions, a new rain-wind induced vibration rig in the NRC 9 m wind tunnel, tests on representative ice shapes in the NRC Pilot wind tunnel, and the formation of ice due to freezing rain in the NRC Climatic Testing Facility. The role of numerical simulations and novel fabrication techniques as a way to overcome model fabrication challenges will be highlighted.

Bio

Sean McTavish studied at Carleton University for 11 years and graduated with a PhD in Aerospace Engineering in 2013. He has been a member of the Bluff Body Aerodynamics Group at the National Research Council since 2013 and specializes in ship-helicopter aerodynamics, heavy-duty vehicle aerodynamics, and stay cable aerodynamics.