



# Structural Reliability-based Assessment of Fatigue and Fracture Design Provisions for Metal Bridges

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## Abstract:

This talk will discuss several examples of fatigue and fracture problems in metal bridges where design provisions are either lacking or where they exist, but knowledge of the provided safety level has been lacking, for various reasons. Efforts to address these gaps through the application of established probabilistic fatigue and fracture mechanics methods will be discussed, and future research needs will be identified. The presented examples will include: fatigue retrofitting of welds using high frequency mechanical impact (HFMI) treatments, establishing fatigue design curves for friction stir welds (FSWs) in aluminum bridge decks, fretting fatigue of bridge stay cables at saddle supports, fatigue design of shear studs in steel-concrete composite bridges, assessment of brittle fracture risk in welded bridge structures, and assessment of fatigue and brittle fracture risk in pedestrian bridges.

## Bio:



Scott Walbridge, Ph.D., P.Eng. (Alberta) is a Professor at the University of Waterloo (ON, Canada), where he has worked since completing his Ph.D. at the EPFL in Lausanne, Switzerland in 2005/6. Prior to his Ph.D. studies at the EPFL, he studied at the University of Alberta and worked in structural consulting in Edmonton, AB, Canada. His research investigates a variety of fatigue, fracture, and structural reliability problems relevant to steel and aluminum structures and employs a variety of tools including structural and materials testing, nonlinear fracture mechanics, structural reliability theory, and life-cycle cost analysis. Scott currently serves as TSC Chair for CSA S6 (Canadian Highway Bridge Design Code) Section 17 (Aluminum Structures), TC Vice-Chair for CSA S157 (Strength Design of Aluminum Structures), and TSC Vice-Chair for the future CSA S7 Guideline for the Design of Pedestrian, Cycling, and Multi-Use Bridges, currently under development. In addition to his work on various structural design codes, Scott currently serves as Program Director for the University of Waterloo's new undergraduate program in Architectural Engineering.

Monday, April 11<sup>th</sup>, 2022 4:00 – 5:20 p.m.

1310 Yeh Student Center