
GCRTC Workshop

Structural Reliability Predictions using Finite Element Models

Summary:

This workshop is a two-day journey from the basics of reliability analysis to nonlinear dynamic finite element reliability and sensitivity analysis. An important objective is to learn structural reliability methods, and to apply them to structures modelled with the finite element method. We address the full range of models, from linear static analysis to nonlinear dynamic analysis. We also include the calculation of exact response sensitivities, which give insights into the behaviour of structures even without reliability analysis.

Workshop Content:

1. Limit-state design and the basic concepts of structural reliability
2. Modelling the uncertainty in the time-of-failure
3. Rules of probability
4. Random variables and functions of random variables
5. The reliability index and the use of probability transformations
6. Reliability methods, from second-moment methods to full-blown FORM, SORM, and sampling
7. Sensitivity analysis and ranking of input parameters according to importance
8. Reliability analysis with linear/nonlinear/static/dynamic finite element models



Bio of the instructor:

Terje Haukaas is a professor in the Department of Civil Engineering at UBC Vancouver. Specializing in structural reliability, he received his PhD degree from the University of California at Berkeley in 2003 under the supervision of Professor Armen Der Kiureghian. Professor Haukaas' background is from Norway, where he worked as an engineer and a master builder of carpentry. During his 19 years at UBC he has conducted research on probabilistic aspects of performance-based earthquake engineering. Software development is an integral part of Professor Haukaas' research. He developed the first version of the Matlab toolbox FERUM and he implemented the first reliability and sensitivity options in OpenSees. At UBC, he spearheaded the development of Rt, a computer program for multi-hazard and multi-model reliability analysis. On his website (terje.civil.ubc.ca) he has made available a collection of Python code for reliability and sensitivity analysis, together with notes and examples. Professor Haukaas has won several teaching awards, including the 2016-2017 UBC Killam Teaching Prize. He was an early-career keynote speaker at the ICOSSAR 2013 conference in New York and he was the organizer of the ICASP12 conference in Vancouver in 2015.

Who We Are

About GCRTC

The Green Construction Research & Training Center (GCRTC) is multi-disciplinary research and training hub at the University of British Columbia (UBC) that enables a multitude of disciplines to work in a symbiotic manner to enrich and broaden all disciplines' capabilities towards greener construction.

Contact Us:

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THE UNIVERSITY OF BRITISH COLUMBIA

Date:

Monday and Tuesday, June 27 and 28, 2022

Time:

9 am – 4 pm

Location:

EME 1202, School of Engineering, UBC,
Kelowna BC

Credit:

12 Formal Professional Development Hours

Fees:

Free for all Attendees