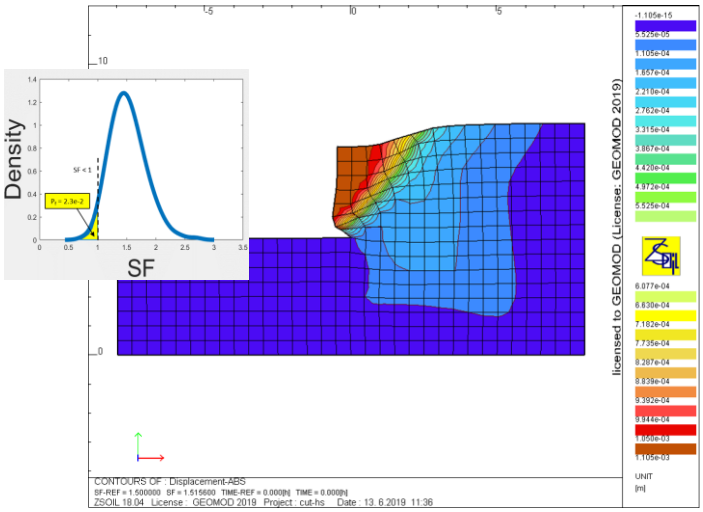
Haute école d'ingénierie et d'architecture Fribourg
Hochschule für Technik und Architektur Freiburg

iTEC

Short course: Uncertainty Quantification, Reliability and Sensitivity Analyses applied to Geotechnics and Structures



Motivation

On one hand, uncertainty is present everywhere in geotechnical engineering and soil-structure interaction analysis: soil parameters like cohesion, friction angle, and elastic modulus are usually not known exactly, and also vary in space. Common practice consists in testing a small number of samples at selected locations, taking the mean or characteristic value of the set, and then performing a deterministic analysis with (partial or global) "safety" factors in order to remain on the safe side. However, this technique does not give much insight into what the actual risk is. On the other hand, probabilistic computational mechanics has made considerable progress in the past twenty years. But while probabilistic considerations are often underlying safety concepts in existing civil engineering norms, they do not enter systematically into safety evaluation or optimization procedures. Today, a stronger integration of probabilistic approaches into safety assessment procedures and geotechnical computational mechanics in general seems appropriate.

This short course will give participants an insight into probabilistic approaches in general, uncertainty quantification, reliability, sensitivity analyses and associated benefits with respect to a deterministic approach. Practical applications including typical geotechnical problems (slope stability, foundation bearing capacity, anchored wall, and tunnel in urban environment) will be discussed and solved using Matlab, combined with UQLab (www.uqlab.com) and ZSOIL (www.zsoil.com).

Target audience
Civil and geotechnical engineers from the practice, researchers

Practical information - UPDATED OCTOBER 27TH 2020

Date and time:	Thursday November 19th, 2020. 09h00-17h00
Place:	**The course will be 100% online, via Zoom: a protected link will be sent before the course begins**
Language:	English, with possible French/German translations when needed
Documentation:	Each participant will get a set of notes

Price, including coffee breaks and lunch

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Regular:	CHF 350, taught online via Zoom
Students:	CHF 175, taught online via Zoom

Registration and payment

Please fill in form at https://limesurvey.hefr.ch/index.php/648879?lang=fr, deadline: Nov. 6th, 2020
A payment link will be sent to you by e-mail after registration, deadline: Nov. 6th, 2020

Speakers

Prof. Dr Bruno Sudret, Dr Stefano Marelli
Chair of Risk, Safety and Uncertainty Quantification
IBK - Institute of Structural Engineering, ETH Zürich

Prof. Dr Stéphane Commend
iTEC - Institut des Technologies de l'Environnement Construit
Filière de Génie Civil, HEIA Fribourg

Tentative program

09h00-09h15	Welcome address	S. Commend
09h15-10h15	Introduction to probabilistic approaches	B. Sudret, S. Marelli
10h15-10h30	Break	
10h30-11h30	Sensitivity and reliability analyses: analytical examples Slope stability, foundation bearing capacity	B. Sudret, S. Marelli
11h30-11h45	Break	
11h45-12h45	Deterministic vs probabilistic design	B. Sudret, S. Marelli
12h45-14h00	Discussion and 60' break	
14h00-15h15	Probabilistic finite element applications 1 Slope stability, foundation bearing capacity	S. Commend
15h15-15h45	Discussion and 15' break	
15h45-16h45	Probabilistic finite element applications 2 Anchored wall, tunnel in urban environment	S. Commend
16h45-17h00	Discussion and short course conclusion	S. Commend

UQLab