rocscience

15th International ISRM Congress: ISRM2023 – Salzburg / Austria

Workshop C: Numerical Modeling Assisted Risk Quantification in Rock Masses

Date:	October 10, 2023
Starting Time:	13:30
Finish Time:	17:15
Presenter:	Anıl Yunatcı, Ph.D., *GeoDestek Ltd. Şti., Rocscience Representative*
Software Used:	Rocscience's **Slide2** (2D Limit Equilibrium), **Slide3** (3D Limit Equilibrium), **RS2** (2D Finite Element), **RS3** (3D Finite Element), **RocSlope** (3D Discrete Fracture Network), **RocFall2** (2D Rockfall Simulation), **RocFall3** (3D Rockfall Simulation)
	A full-featured trial version will be provided to workshop participants. The participants are encouraged to bring in their laptops for following the exercises throughout the session. Soft copies of numerical models will be shared with audience who have enrolled to the event, prior to the session.
Target Audience:	The workshop is open to contribution from all participants of experience and interest in geomechanics with backgrounds in geology, mining and civil engineering. The event is designed to flow in a thought-provoking style, and is designed to address undergraduate and graduate students, practitioners and researchers.

Workshop Outline

SESSION 1

13:30 – 14:20

Understanding, Characterizing and Reflecting Uncertainties into Engineering Models

Approximate Duration: 50 mins

The workshop aims to build grounds for open discussion on building an agile framework for introducing parametric uncertainty in performance assessment of rock slopes, rock fall simulations or underground openings through numerical modelling. The perspective is to be presented focusing on the current state of art in conventional design procedures, including the ones not necessarily being outlined by codes and regulations. The discussion will begin by presenting basic concepts of probability and distribution of random variables; which are to be defined within the context of input parameters for rock fall simulations, limit equilibrium and/or finite element-based analyses. A special emphasis will be given to discuss the methods for site characterization and testing, and implications on parameter estimation. The discussions will be kept restricted to problems which can be characterized through limited deformation concepts.

Break (10 mins.)

SESSION 2

14:30-17:15

Practical Cases and Hands-on Exercises Using Rocscience Software Tools

Approximate Duration: 150 minutes, 15 minutes break

Typical methods for quantifying parameter uncertainty in terms of geological characterization, basic strength stiffness and other fundamental inputs as well as uncertainty in mobilized support element capacities, external loading-based uncertainty will be discussed, in the light of practical problems. External loading-based scenarios will be discussed in the light of uncertainty (both aleatory and epistemic) in dynamic loading parameters, i.e. earthquakes. The examples will be presented in an order of increasing complexity, coupled with discussions on case specific sensitivity of key input parameters. The discussion will evolve towards how to properly quantify risk definitions; specific to each case study and generating a well communicated technical output by geoengineers for the benefit of the community. The workshop participants will not be only exposed to the basic concepts in quantifying uncertainty in geomechanical modelling process but will also have an understanding on how these independent or correlated set of factors may impact the results and guide decision makers for improved risk management.

Discussed subtopics will be supported by 2D/3D numerical analyses, within an interactive framework augmented by participant feedback.