

Workshop F

DFN analysis for Open Pit Slope Stability

Presenters: Steve Rogers & Pedro Ojeda.

Recent Discrete Fracture Network (DFN) analysis and modelling have resulted in significant advances in how we analyse and model fractured rock masses. A major area of development has been DFN-based slope engineering, with advances in bench-scale analysis as well as inter-ramp and wall-scale stability analysis. This short course aims to introduce attendees to the theory behind DFN modelling and provide practical examples of how DFN methods are used, while also offering hands-on experience with WSP's DFN code, FracMan®. A 30-day free licence of FracMan (Geotechnical edition) will be provided to all attendees. Key areas that attendees will learn about include:

- Describing a rock mass using DFN methods and defining the key probabilistic input parameters
- Understanding the advantages of DFN-based bench-scale analysis over conventional bench-scale kinematics
- Running slope-scale kinematic assessments on intermediate and major structures using geologically constrained DFN models
- Incorporating rock mass strength and pore pressure into slope-scale assessments

Course Overview

The workshop will cover the following topics:

Topic 1: Introduction to DFN modelling and Basic Concepts of DFN Modelling

- What is DFN modelling, where has it come from and what does it offer that is different to conventional analysis?
- What are the primary inputs we need for building a DFN model and where do we get these data from?
- How do we demonstrate that we have a “good” DFN model?
- Exercises in using the FracMan DFN software as well as deriving structural size data

Topic 2: DFN-based Bench Stability Analysis: Beyond Simple Kinematics

- Shortcomings of conventional kinematics, and how a DFN approach can provide a more realistic alternative that addresses many of these limitations

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- How the DFN approach works, and how to think about the probability of block formation rather than just block stability
- Visualising and interpreting the results
- Exercises demonstrating how DFN-based bench-scale kinematics works
- A case study showing a practical example of DFN bench stability analysis

Topic 3: DFN-based Inter-Ramp Analysis

- Developing inter-ramp and wall scale DFN models of major and intermediate scale structures
- Inter-ramp scale kinematics and the development of slope-scale heat maps of block occurrence
- Combining DFN models and Limit-Equilibrium (3DPOF) analysis to enhance slope-scale kinematics and include rock mass strength and pore pressure
- Exercises exploring inter-ramp scale major-structure kinematics and 3DPOF analysis
- A case study showing an example of slope derisking using DFN models coupled with Limit-Equilibrium (DFN-LE) analysis

Who should attend?

The target audience is geotechnical engineers, rock mechanics engineers, and geologists who would like to understand more about DFN modelling and its application to slope characterisation and stability, as well as gain hands-on experience with WSP's FracMan DFN software.

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