SHORT COURSE

Title: 2D/3D Slope Stability, Seepage & Stress Analysis

Instructors: Murray D. Fredlund, Ph.D., PEng, President/CEO, SoilVision Systems Ltd.
Todd Myhre, B.SC., Lead Developer, SoilVision Systems Ltd.

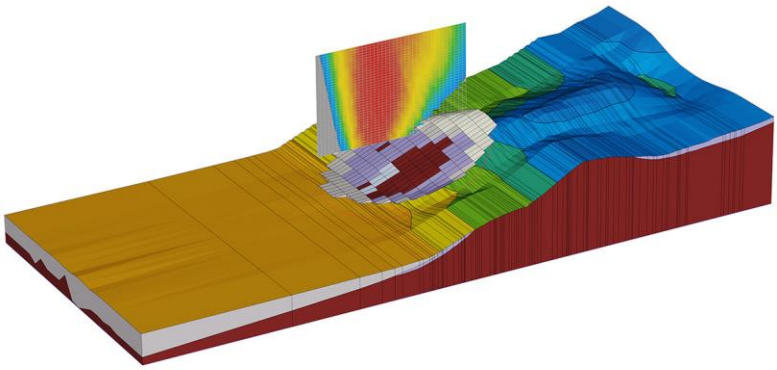
Guest Lecturer: Delwyn G. Fredlund, Ph.D., OOC

Date: October 26 - 27, 2017
Duration: 8:30am to 4:30pm
Cost: $995 CDN
Student Cost: $335 CDN
Location: SoilVision Systems Ltd., 120 - 502 Wellman Crescent, Saskatoon, Saskatchewan

Overview:
The benefits associated with performing 3D slope stability analyses were introduced in the 1970s. Over the years a number of 3D methods of analysis have been researched. These methods have ranged from the method of columns to approaches based on variational calculus, and more recently, the use of dynamic programming. Interest in 3D slope stability analysis appears to be driven by the fact that most slope stability failures are inherently three-dimensional in character. That is, the failure surface most often represents a variation on a dish-shaped surface. Two-dimensional representations are a significant simplification of the actual situation. It is somewhat surprising that geotechnical engineers have been as successful as they have been in using two-dimensional simplifications of three-dimensional geometries for slope stability studies.

Industry has largely embraced a two-dimensional approach with respect to slope stability analysis as an accepted method of practice and acceptable design factors of safety generally range between 1.3 and 1.5. The calibration to well-instrumented failures has typically involved performing 2D back-analyzing of failed slopes and accepting the results as a “reasonable calibration”, even though the slope failed in a 3D manner.

The first part of the first day will focus on the new conceptual model builder (SVDESIGNER™), which can be used to ease the development of complex 3D numerical models. Methodologies for placing geotechnical designs on complex topologies will be discussed. Methodologies for quickly extracting 2D cross-sections or full 3D numerical models will also be covered.



The second part of the first day will focus on 3D slope stability. This course will present advanced topics related to both 3D slope stability analysis, conceptual model design, seepage analysis, and stress deformation. The course will include a brief theoretical review of 2D theory but focus on 3D theory and applications. The management of complex 3D spatial data will be discussed as well as modeling methodologies related to 3D numerical modeling. The focus will be on advanced concepts of slope stability analysis and their application. Applications of 3D solutions to real-world problems will be covered.

The second day of the course will examine the use of 2D/3D seepage analysis and 2D/3D stress/deformation analysis as a stand-alone analysis of as integrated with slope stability. A focus of the short course will be on the estimation of unsaturated hydraulic properties for seepage analysis using the SVSOILS™ application. The user will come away with a practical knowledge of how to create and solve 3D groundwater seepage and 3D stress/deformation numerical models.

The course is designed for practicing geotechnical and mining engineers that want to utilize the benefit of 3D numerical modeling for increasing the capabilities of their consulting firm or university research. The course also introduces the new SVOFFICE™5/GT Geotechnical Analysis Suite, which brings new and improved cutting edge 3D analysis capabilities to the practicing geotechnical engineer. Participants are invited to bring their own laptops to the course. They will be provided with copies of the SVOFFICE™5/GT software to follow along during the short course. 50% of the cost of the short course can be applied to subsequent software purchases made within the following 6 months.

COURSE DETAILED OVERVIEW

DAY 1 – SVDESIGNER™ & SVSLOPE®

AM Conceptual Model Design

- SVOFFICE™5/GT – What's changed?
- Conceptual model design using SVDESIGNER™
- Managing complex 3D geometry
- Example 3D conceptual model of tailings dam and facility
- Trends in theory & development of 2D/3D slope stability analysis
- Brief theoretical overview of 2D slope stability analysis

PM Slope Stability Analysis

- Unsaturated slope stability analysis
- Overview of 3D slope stability analysis – why do it?
- Basic theoretical overview of 3D slope stability analysis
- What are typical variations between 2D and 3D analysis?
- Earth slope 3D slope stability analysis
- Open pit: 3D slope stability analysis

DAY 2 – SVFLUX™ & SVSOLID™

AM Groundwater Seepage Analysis

- Modeling unsaturated soils in engineering practice
- Understanding of coupling seepage and slope stability
- Incorporating unsaturated analysis in slope stability using SVSOILS™
- Solution of typical models with SVFLUX™ & SVSLOPE®
- Estimation of unsaturated hydraulic properties
- Solution of 2D/3D seepage numerical models

PM Stress/Deformation Analysis

- 2D theory of stress/deformation analysis
- Analysis of 2D/3D slopes using the Shear Strength Reduction (SSR) method
- Solution of 2D/3D stress deformation numerical models
- Solution of typical 3D numerical models