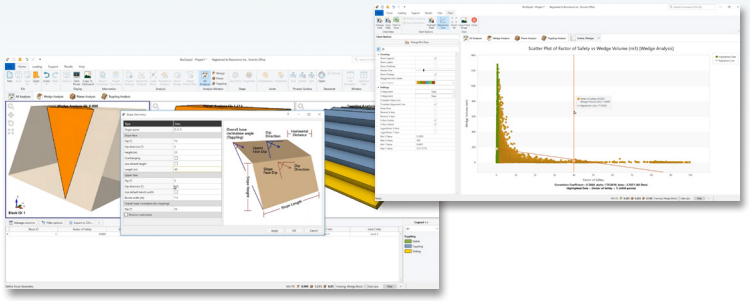
rocscience



WEBINAR

Introducing RocSlope2: Revolutionizing Rock Slope Stability Analysis

Q1: Is this software similar to RS3 and 3DEC for rigid blocks? Where only joint deformation and move?

A1: RocSlope2 models blocks as rigid bodies which can sliding along planar joints. Unlike RS3 (Finite Element Method) and 3DEC (Distinct Element Method), RocSlope2 uses Limit Equilibrium Method wherby force and/or moment equilibrium conditions are examined on the basis of statics to obtain a Factor of Safety, and does not employ stress-strain behaviour.

Q2: Beside spot and pattern bolting, are the manufactures specs preloaded into the software program? Can we also model dowels and strand anchors like in UnWedge?

A2: Currently, predefined manufacturer libraries are not included in RocSlope2 but is in the roadmap for future implementation. Different types of anchors can be specified like UnWedge, such as mechanically anchored, friction, expandable, and user-defined bolts with capacities for tensile, shear, plate, bond strength, etc.

Q3: Respected esteemed speakers, I am one of Engineering Geology student from Bhutan who is interested in using this tools to help us understand more about the earth surface. But due to lack of not having a complete software, it is very difficult. If given opportunity to explore on it i would be really grateful. It would really help me in studying the mountainous terrain of Bhutan

A3: You can request a trial through the Rocscience website by clicking “Free Trial” https://www.rocscience.com/software/rocslope2

Q4: Does planar, wedge and topple software will be discontinueded?

A4: RocPlane, SWedge, and RocTopple softwares will still be available for download and purchase along with online documentation.

Q5: Can you batch process to evaluate which planes/wedge failure mechanisms are affected by different slope dip direction? For example, consider a circular pit with 3 systematic joint orientations. As the dip direction of the pit slope changes, so will the kinematic influences. In certain wall sectors, planar instability may control bench scale instability, while in others wedge instability may govern. It would be handy to be able to simply put in a range of wall sector azimuths, and spacing (for example 000-030, 030-060, 060-090, etc etc) and have a series of analyses completed in a batch process. Or is this better accomplished in RocSlope3?

A5: For bench-scale or simple slope geometries, RocSlope2 is a suitable analysis software for this type of analysis whereby for a chosen joint (planar) or joint pair (wedge), a Sensitivity Analysis can be performed by varying the Slope Dip Direction over a range to obtain a graph of Factor of Safety vs Slope Dip Direction. The advantage of using RocSlope2 is modeling ease and compute efficiency whereby a model can be created with few inputs and 100s to 1000s of blocks computed within seconds.

RocSlope3 is a software dedicated to risk analysis whereby the actual 3D slope geoemtry is input along with the locations/orientations/size of discrete jointing. A safety map can then be computed showing the locations and extents of where blocks form, have the lowest factors of safety, highest support demand, largest failure volume/weight/depth, etc.

Q6: Can you specify joint sets and FIsher distributions with the intent of not allowing the program to generate wedges for joints witin the same joint set?

A6: Joint orientation statistics can be modeled by the Fisher distribution. In RocSlope2 you can prevent joints from the same joint set from intersecting. If you would like to perform a Set vs. Set intersection for wedge generation (i.e., intersect only joints from Set1 with joints from Set2), then simply select the “Use seperate joint sets” option in Define Joint Orientation dialog and add the list of joints in each joint set.

Q7: Why did RocSlope3 come out before RocSlope2?

A7: The main motivation behind RocSlope3 was to provide the missing gap in industry needs for a limit equilibrium software specialized for structurally-controlled rock slope stability whereby the slope geometry is defined using real 3D geometries and joints are modeled discretely with orientation, location, and shape. RocSlope3 serves as a risk-analysis tool for mapping out regions most susceptible to failure, and identifying the scale (volume, depth) of these failures, along with support demand.

For simple slope and block geometries where joints are assumed to be ubiquitous and infinite (user has no spatial information about jointing so the assumption is conservative in that joints repeat and can occur anywhere to form a block), we had RocPlane, SWedge and RocTopple. The vision behind RocSlope2 was to unify these analysis modes (i.e., planar, wedge, and toppling) into a single set of modeling parameters so that for a given slope geometry and set(s) or jointing, all modes of failure are considered. The hope is that this would greatly streamline the user's workflow for an all-encompassing analysis.

Q8: Can you add multiple material layers / angles?

A8: RocSlope2 asumes a homogeneous slope rock material. However, multiple joint properties and orientations can be added.

Q9: Why you did not change the slope dip direction and slope angle?

A9: The purpose of the demonstration was to provide a live introduction to the RocSlope2 program in action. Provided that the webinar is time-limited, only so many features could be covered. For examples or more use-cases and feature coverage, please check out the RocSlope2 tutorials:
https://www.rocscience.com/help/rocslope2/tutorials

and online documentation
https://www.rocscience.com/help/rocslope2/documentation

You can request a free trial through our website:
https://www.rocscience.com/software/rocslope2

Q10: As far as I understand, Dips is a subset of RocSlope2. If we consider that we are not interested in the feasible failures but only in the critical safety factor, would you solve a rock slope stability problem using directly and exclusively RocSlope2 skiping feasible failure modes using Dips?

A10: To be clear, Dips is a precursor to RocSlope2 and RocSlope2 does not replace Dips . Raw orientation data is processed in Dips to obtain a list of Dip/Dip Directions and feature analysis is performed to identify trends in data such as joint sets and set statistics. A Kinematic Analysis is then performed in Dips to identify the propensity of failure for the various failure modes and to identify the critical planes/intersections.

Dips data is then imported into RocSlope2 to perform a limit equilibrium analysis for the various failure modes to obtain a factor of safety taking into account the effects of joint persistence, actual block geometry, shear strength, water pressure, external forces, and supports. Skipping Dips interpretation may lead to the wrong input of data into RocSlope2 such as the failure to identify bad data (spun core, blind spots, sampling bias), or the influence of joint sets and sets vs. set intersections when forming wedges.

Q11: Do you have to analyse every joint recorded in Dips? Typically we would analyse the Major Planes from Dips in RocPlane and SWedge.

A11: This is up to the user's interpretation. RocSlope2 offers the ability to model major planes in a deterministic manner or in a probabilistic manner (given the mean set orientation and Fisher statistics), or ALL planes in a combinations manner by intersecting all possible planes from within a set or between two sets.

Q12: Just to clarify, is RocSlope2 capable of all the features and functionality of the individual RocPlane, SWedge, and RocTopple programs? As if we have licenses for all three just packaged into one program?

A12: The vision behind RocSlope2 was to unify these 3 analysis modes (i.e., planar, wedge, and toppling) into a single set of modeling parameters so that for a given slope geometry and set(s) or jointing, all modes of failure are considered. The hope is that this would greatly streamline the user's workflow for an all-encompassing analysis. The feature set of RocSlope2 is all encompassing of the capabilities of RocPlane, SWedge, and RocTopple and more (with the exception of some differences in water pressure models from SWedge/RocPlane, manufacturer bolt libraries, and Automate from Excel). Water pressure models now provide a better and more unified approach by allowing users to define either constant pressure, water elevation, or a phreatic surface. This is only the beginning of RocSlope2 and we have many more things planned in pipeline such as adding manufacturer bolt libraries and scripting to automate inputs.

Q13: Can different materials be set for one analysis? For example if the first 10 feet is clay then the next 10 feet is sandstone.

A13: The rock mass is modeled as homogeneous material with a uniform unit weight. The unit weight of the rock only affects block weight.

Q14: Happy to see that bolt patterns are possible. How are the patterns implemented, only a single line or more complex 2D patterns? In the patterns, what constitutes a valid vs. invalid bolt in the analyses?

A14: Bolt patterns are added as rectangular array of bolts with x and y spacing. In order for a bolt to have an effect on the Factor of Safety, its head must be on the face of the block and pass through the joint to anchor into the rock mass.

Q15: Can you run the analysis using Eurocode partial factors?

A15: Yes, Eurocode 7 design standards are supported in RocSlope2 and predefined in Project Settings > Design Standards. You can also optionally define custom design standards with custom partial factors.

environment:
https://www.rocscience.com/help/rs2/tutorials/scripting/getting-started-with-rs2-python-scripting

After installing the library, take a look at our examples to start writing RS2 workflows!
https://www.rocscience.com/help/rs2/tutorials/scripting/anchored-sheet-pile-wall