Dips version 6.0 has arrived, a major new upgrade to our popular stereonet analysis program. New features in Dips 6.0 include a comprehensive kinematic analysis toolkit for planar, wedge and toppling analysis; significant improvements to the user interface and graphical interactivity; dip vector and intersection plotting; fuzzy cluster analysis and much more. This article highlights the major new features in Dips 6.0 including:

- Kinematic Analysis
- Dip Vectors
- Intersections
- Cluster Analysis
- Interactive graphical editing
- Save View State

Kinematic Analysis

One of the first things you will notice is the new Kinematic Analysis option for rock slope stability analysis. You can quickly and easily evaluate the potential for planar sliding, wedge sliding, flexural toppling and direct toppling failure modes.

Simply input the slope orientation and friction angle, choose the failure mode, and a template is overlaid on the stereonet, highlighting the critical zone. The number of poles or intersections in the critical zone is automatically calculated and displayed in the legend.
Kinematic overlay for planar sliding

Kinematic analysis can be performed using the input dialog shown on the previous page. Shortcuts are also available in the sidebar as shown below.

Sidebar shortcuts for kinematic analysis

The analysis is highly interactive – you can change the input parameters and the stereonet view and analysis results are updated immediately on the screen. You can quickly perform a sensitivity analysis by varying input parameters and exporting results.
Kinematic Analysis of wedge sliding

Kinematic Analysis of flexural toppling
Dip Vectors

Dip vector plotting is new to Dips 6.0. Planes can now be represented by either pole vectors or dip vectors. Simply choose the vector mode from the toolbar:

Pole vector mode:  
Dip vector mode:  

In addition to the basic vector plot, you can view contour, symbolic or scatter plots based on dip vectors or poles, according to the mode setting.

Pole vector and dip vector plots of the same data set

Dip vector plotting is sometimes preferred for analyses such as kinematic. For example, planar sliding and flexural toppling can be analyzed using either pole vectors or dip vectors.

Note that Sets can only be defined while viewing pole vectors, since the graphical creation of sets from dip vectors is not valid.
Intersections

Intersections of planes can be plotted in *Dips 6.0*. The intersection of two planes forms a line in 3-dimensional space which plots as a point on the stereonet. Intersections are used in kinematic analysis for wedge sliding and direct toppling failure modes, and can also be contoured like pole or dip vectors.

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**Kinematic analysis, wedge sliding using intersections of all planes**

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**Intersection display options**
Intersection contours and wedge sliding kinematic analysis

Several different options are available for plotting intersections. You can plot:

- The intersections of all planes in the file
- The intersections of planes belonging to specific sets
- The intersection of major planes (i.e. user defined planes and/or mean set planes)

Kinematic analysis, direct toppling using intersections of all planes
Set Windows

Some major improvements have been made to the Set Window options:

- The new freehand set window option allows you to select any group of poles with an arbitrarily shaped set window
- The original set windows can now be drawn clockwise or counter-clockwise
- Set windows can be graphically edited (re-sized) by clicking on them with the mouse and dragging the control points

New freehand set windows drawn around three pole groupings

Click on a set window to graphically re-size with the mouse
Cluster Analysis

Another tool for the selection of joint sets is the Cluster Analysis option. Simply click on any pole grouping on the stereonet, and *Dips* will automatically determine the nearest corresponding joint set using a fuzzy cluster algorithm.

**Cluster selection dialog**

Clusters pre-selected with maximum cone radius
Set windows determined from cluster analysis

Note that sets determined from either the freehand set window option or the cluster analysis option, are equivalent in most respects to the sets determined from the original curvilinear (four-sided) set windows used in *Dips*. The mean planes determined will be exactly the same, for the same grouping of poles, regardless of the method of set window creation.

However, set windows determined from freehand or cluster analysis cannot be graphically re-sized once created. They can be deleted like regular set windows but they cannot be re-sized.
Scatter Plot

The scatter plot option has been greatly improved in Dips 6.0, and uses a bubble plot style where the size of the bubble indicates the pole concentration. This makes the scatter plot much more useful, as it is easier to identify pole concentrations on the scatter plot.

This is a great improvement over the Dips 5.0 scatter plot which utilized a symbolic plot style (different symbols of equal size). Of course the contour plot is still the main tool for viewing data concentrations, but the scatter plot is now much more useful than previously.
Fold Analysis

A commonly requested feature was the ability to fit a plane through a set of poles, for the analysis of folds and related statistical results. This functionality has been added to Dips 6.0. You can select any group of poles and a best fit plane and all relevant statistics will be determined. Alternatively you can determine the best fit plane for all poles in the file.
New Application Interface

As *Dips* 5.0 users will appreciate, the program interface for *Dips* 6.0 is all new. Notable improvements include:

- New sidebar control panel for easy access to plotting and display options
- New menus and toolbar icons
- New and improved legend display including multiple legends on one view
- New right-click shortcuts
- New popup data tips
- Zoom and pan plot views

*Interface improvements – sidebar control panel, toolbars and legends*

*Dips* 5.0 users will notice many other improvements to the usability of the program as they become familiar with the new and improved features of *Dips* 6.0.
Interactive graphical editing

Another significant upgrade for *Dips* 6.0 is the graphical interactivity with objects on the stereonet. You can now click on most objects on the stereonet (e.g. planes, cones, drawing tools, text boxes) and easily edit them by clicking and dragging with the mouse or using right click shortcut options. When an object is selected, its properties are displayed in the sidebar control panel and editable properties can be customized in the sidebar or in an edit dialog.

*User defined plane selected for editing*

For example, in the figure above a user defined (added) plane has been selected by clicking on it with the mouse. While in this mode, you can graphically adjust the dip and dip direction (independently or both) with the mouse or edit the values in the sidebar.

*Selected plane properties displayed in sidebar*

Similarly, cones (small circles) can also be edited graphically. You can adjust the cone radius, location, or both radius and location by clicking and dragging with the mouse.
Cone (small circle) selected for editing

Text boxes with dynamic text can easily be added, moved and edited with a few mouse clicks.

Text box right-click menu options
**Undo / Redo**

*Dips* 6.0 includes a new very powerful undo / redo functionality. Virtually all actions you perform on the file (editing the spreadsheet, adding or editing elements on the stereonet, customizing display options) can be undone (or redone) with the global undo / redo option.

*Undo / redo toolbar buttons*

Multiple actions can be simultaneously undone (or redone) by selecting from the recorded list of actions in the toolbar drop-down menu beside the undo / redo buttons.

**Save View State**

*Dips* 6.0 now saves the complete view state of the file each time the file is saved. For example, if you have multiple stereonet plot views open (e.g. symbolic, contour) with customized display options in each view, when you re-open the file all views will be restored exactly as they were when the file was last saved. A common complaint with the old *Dips* 5.0 was that plot settings (particularly the symbolic plot) were not saved. This has now been remedied.

*Multiple plot views can be customized and saved*
Report Generation

*Dips* 6.0 offers greatly improved options to facilitate report generation, including:

- Improved info viewer layout with customizable output
- Improved printing and print preview with customizable title blocks
- Export all data to Excel

Summary

*Dips* 6.0 is a long awaited major upgrade from *Dips* 5.0. We are confident that all users of *Dips* will find many new uses for the powerful features now available. For a complete listing of all new features in *Dips* 6.0 see:

[What’s New in Dips 6.0](http://www.rocscience.com/downloads/trial_versions)

To request a free trial version contact our office or see: