



What's New in *UDEC* 7

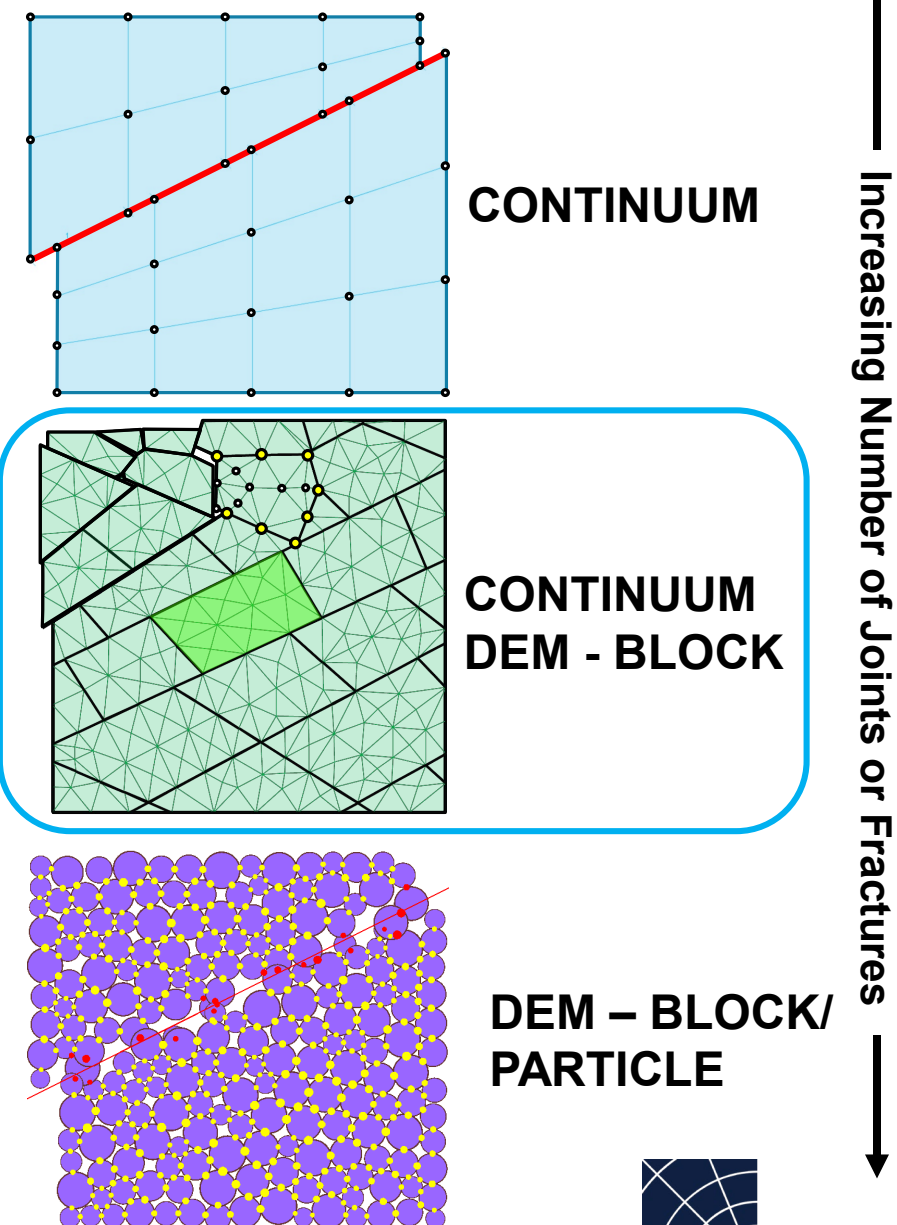
Webinar

Presented on December 3, 2019

Q&A follow-up has been added post-webinar.

Background

- **Universal Distinct Element Code (UDEC)**
- 2D software first released in 1985 (33 years ago)
- Simulates the quasi-static or dynamic response to loading of media containing multiple, intersecting joint structures
- Large displacements along discontinuities and rotations of blocks can occur
- Models may contain a mixture of rigid or deformable (i.e., zoned) blocks (DEM, continuum, or combination)
- Version 7 represents a **major** transition from the *G/I/C* (Graphical Interface for Itasca Codes) to the Common Framework (GUI) used by Itasca's 3D programs

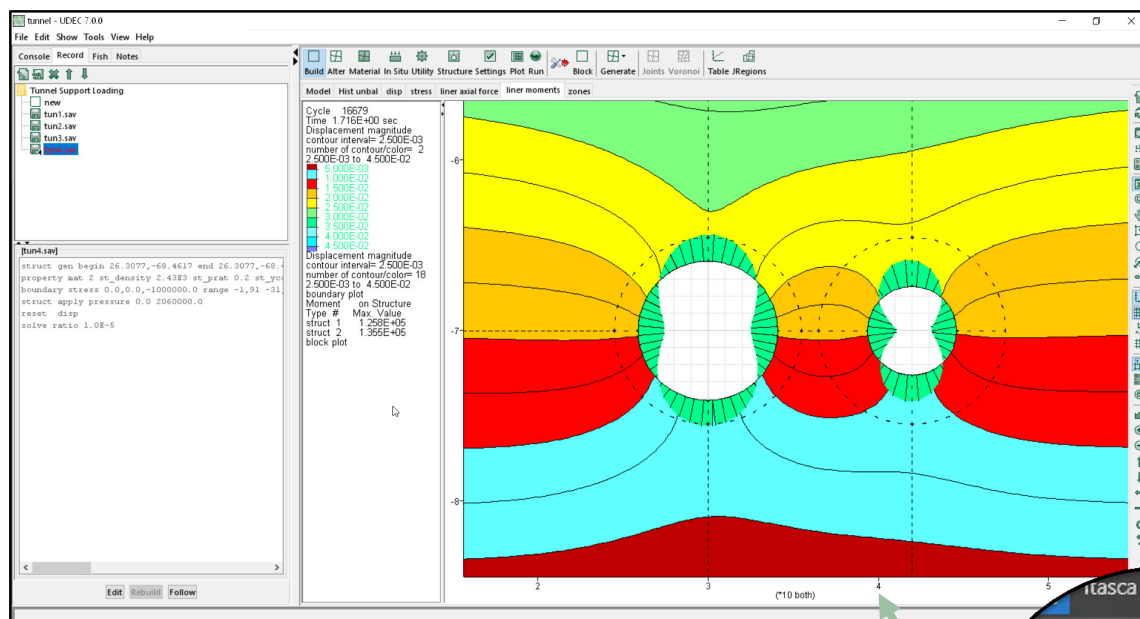


New Features

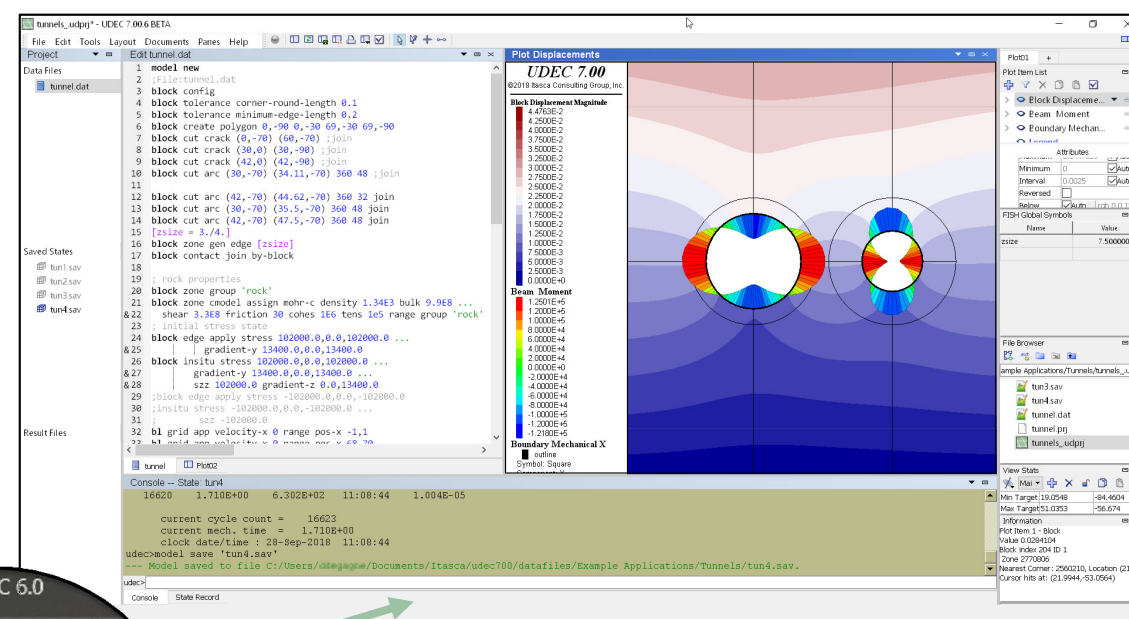
- Two flavors (GIIC and GUI)
- More online HELP
- Enhanced plotting [GUI]
- Updated Command and *FISH* (extended) syntax
- Advanced built-in text editor [GUI]
- New model construction tools
- New joint and Discrete Fracture Network (DFN) tools
- New analysis and data querying tools
- And more ...

Two Flavors

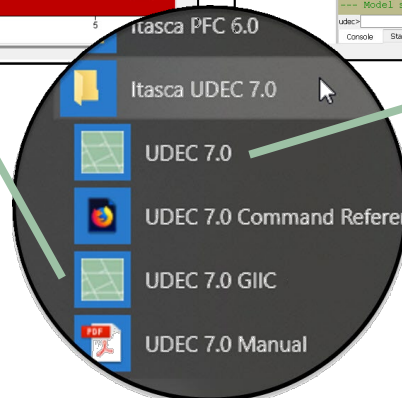
TRADITIONAL GIIC



COMMON FRAMEWORK GUI

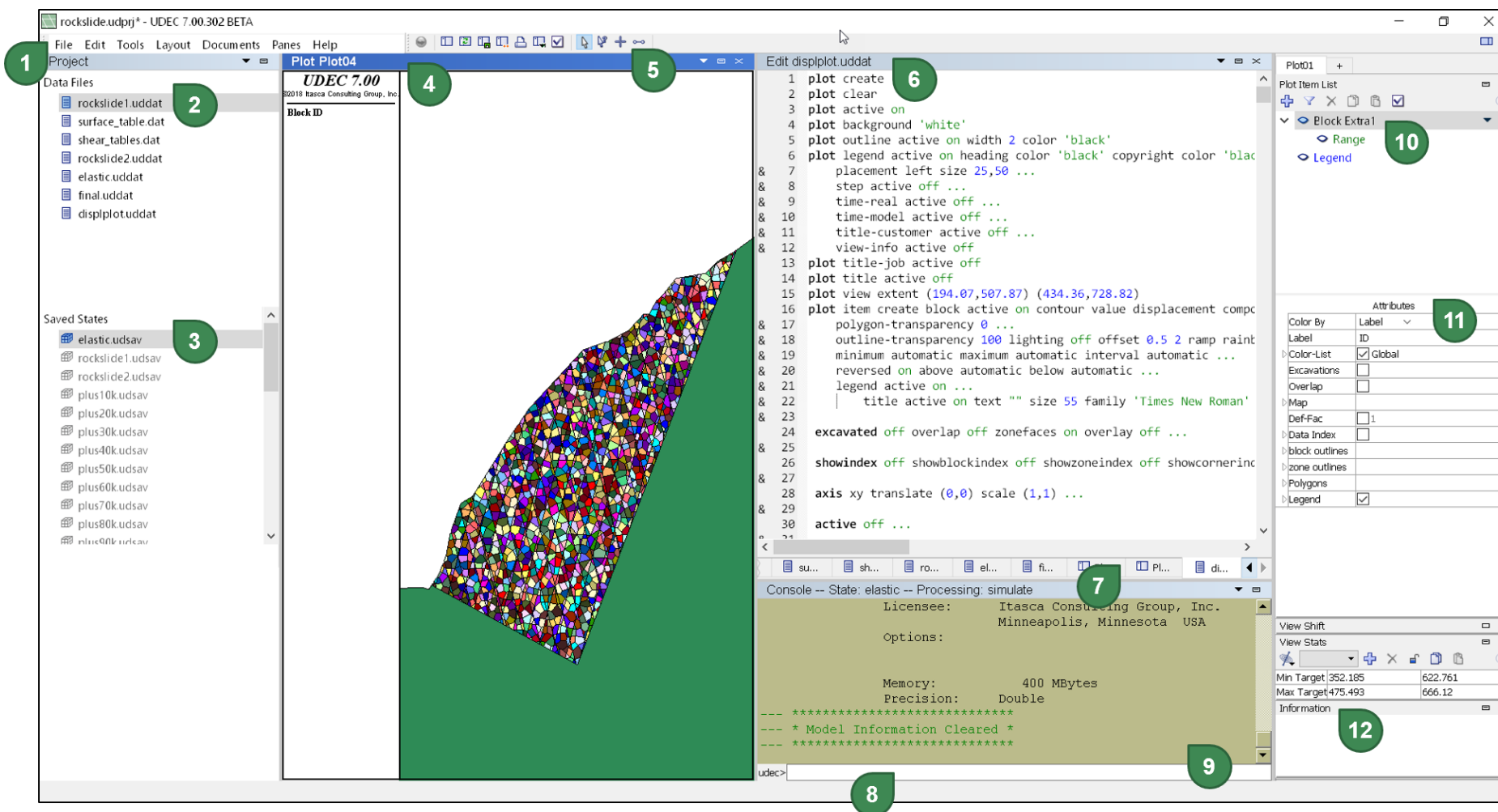


- Graphical Interface for Itasca Codes
- Interactive modeling tools
- Unique project files
- Common data & save files



- Graphical User Interface
- Powerful processing tools
- Unique project files
- Common data & save files

New GUI

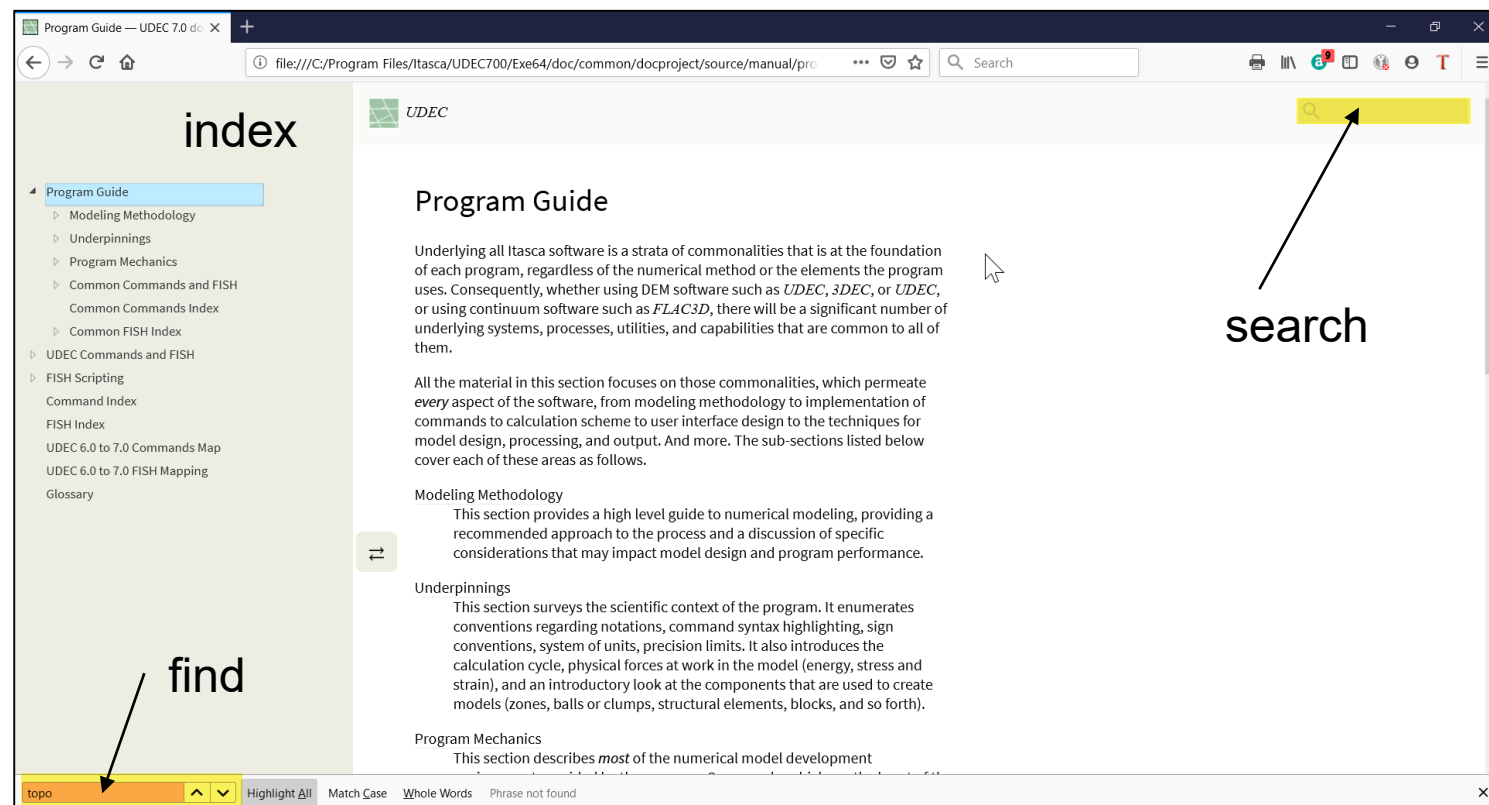


- (1) Main menu
- (2) & (3) Project pane
- (4) View pane
- (5) Contextual tool bar
- (6) Built-in text editor
- (7) Document tabs
- (8) Command line
- (9) Console pane
- (10) Plot items
- (11) Plot item attributes
- (12) Model information

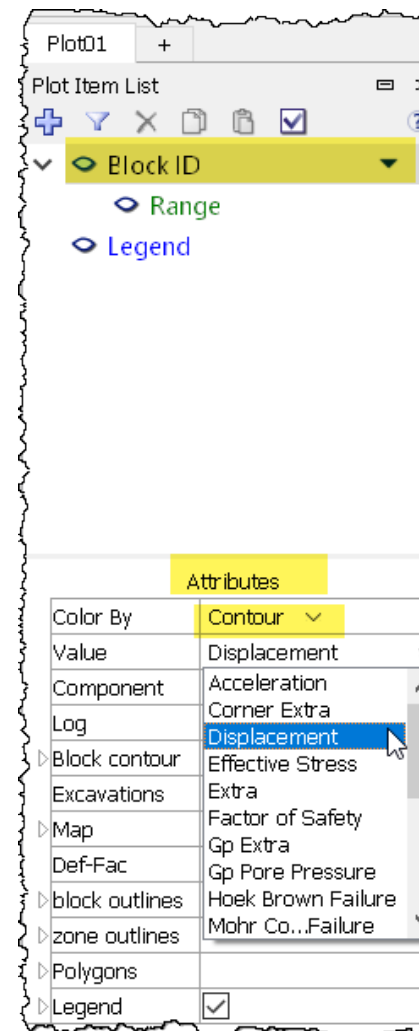
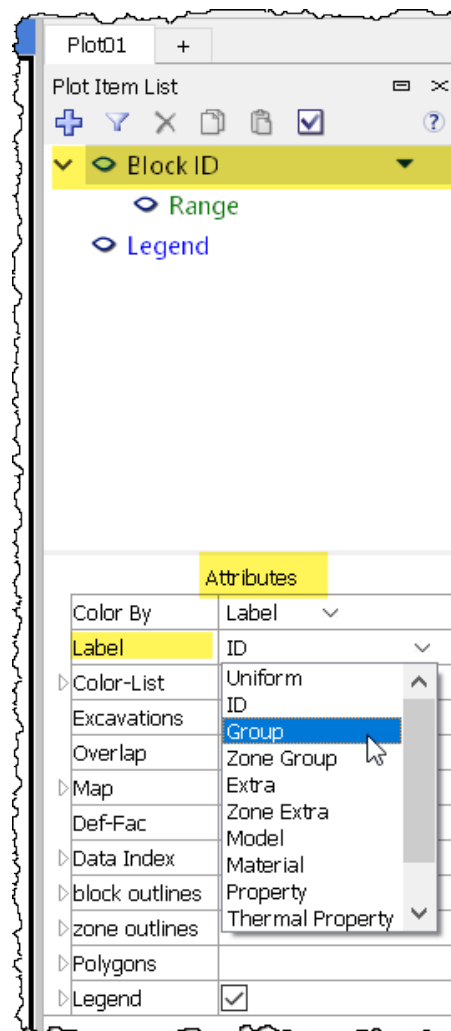
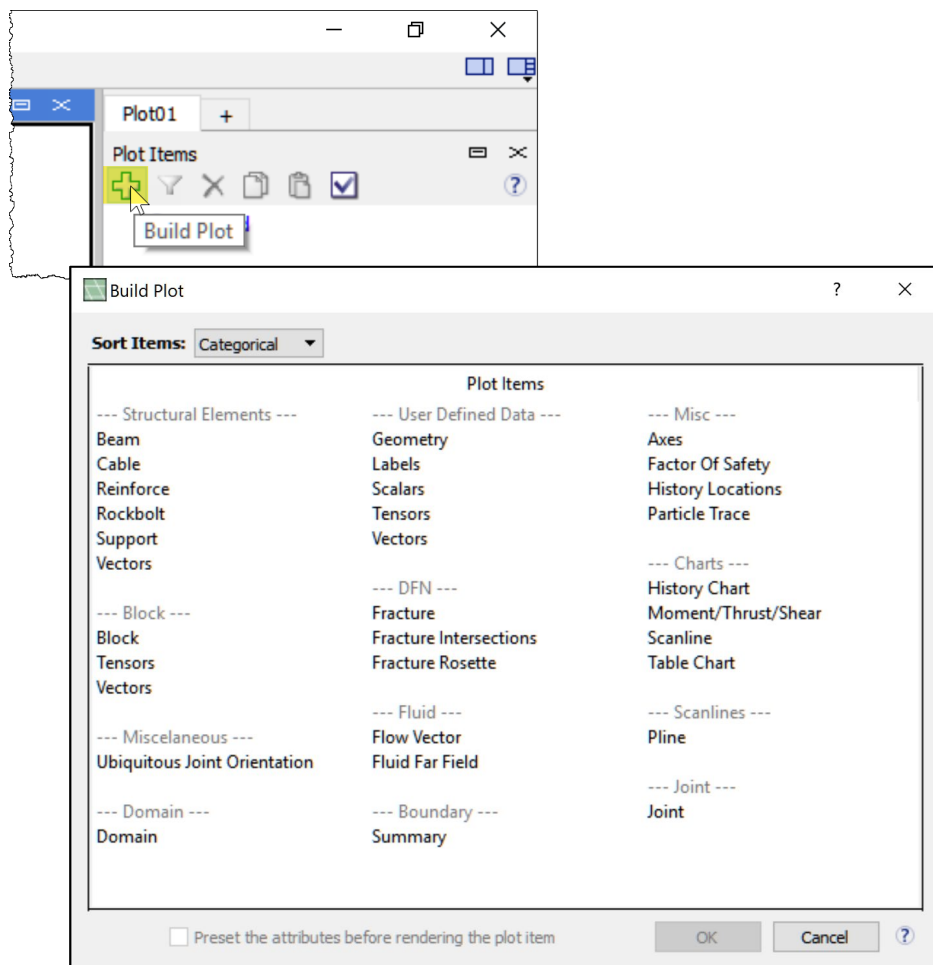
Control Panel

Online Help

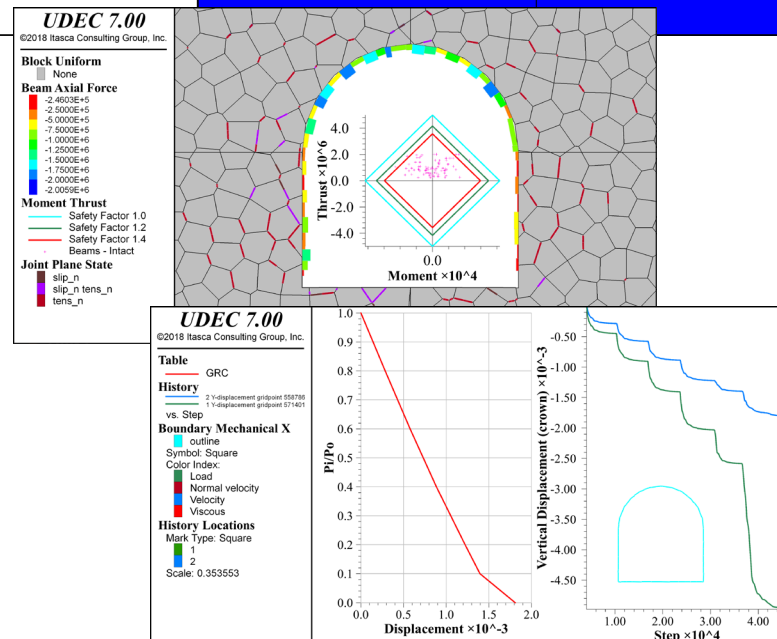
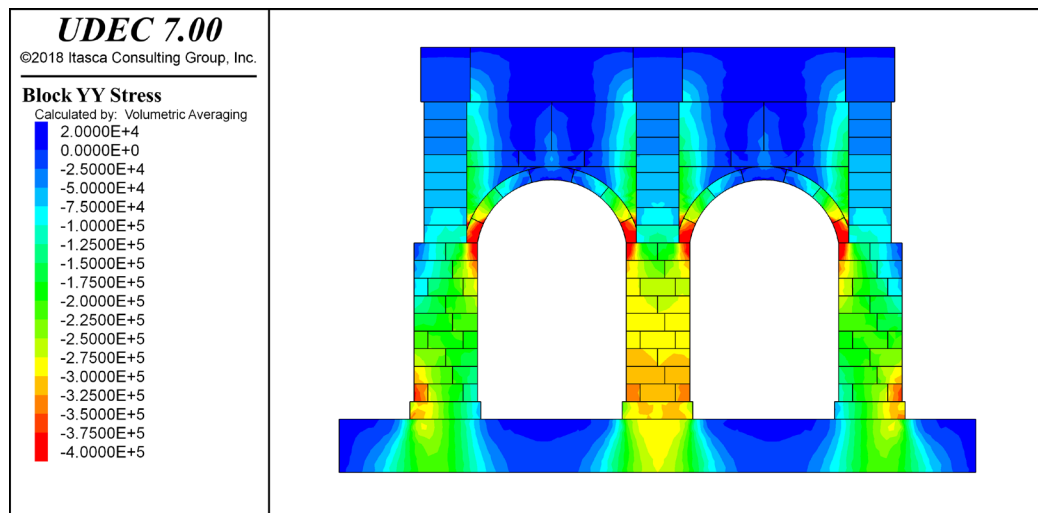
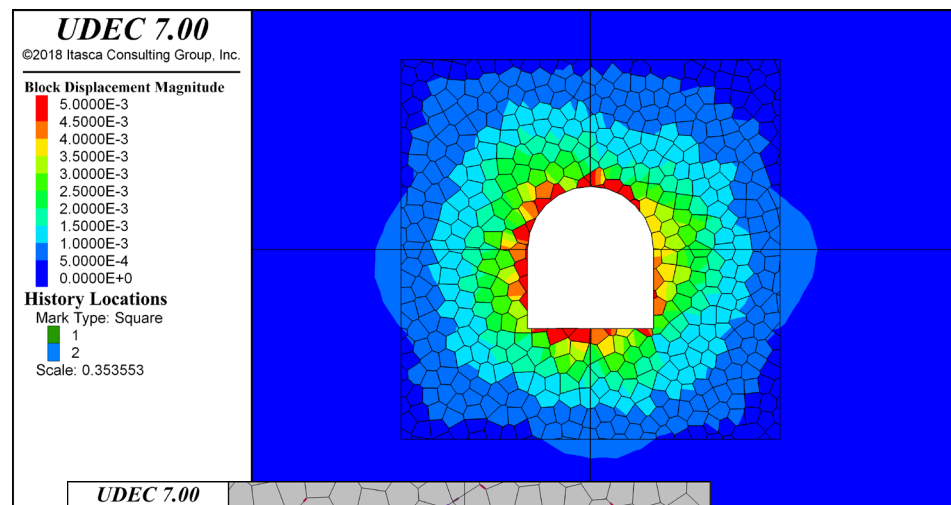
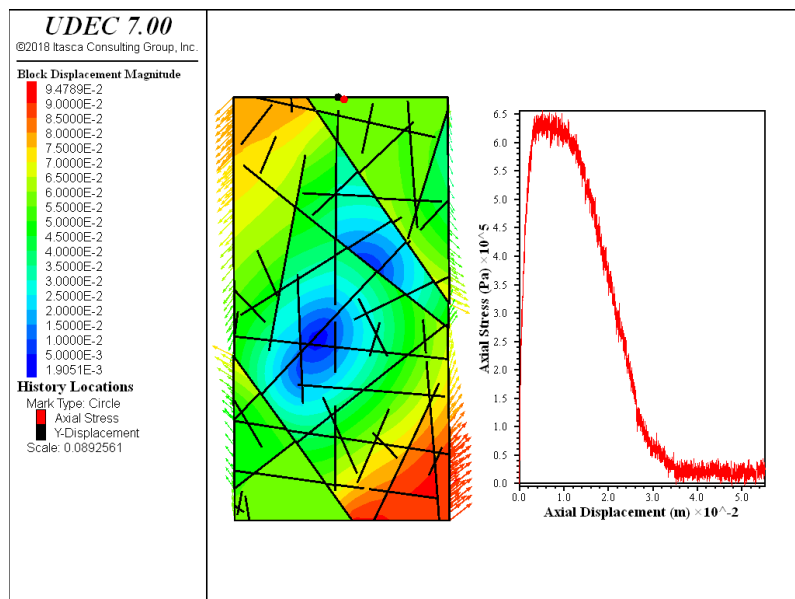
- Manual PDFs [GIIC]
- HTML-based system [both]
- Use Help → *Help* menu item [both]
- Use ? in command line [both]
- Use cursor and *F1*-key [GUI]
- Searchable across all content
- Use browser find tool within pages



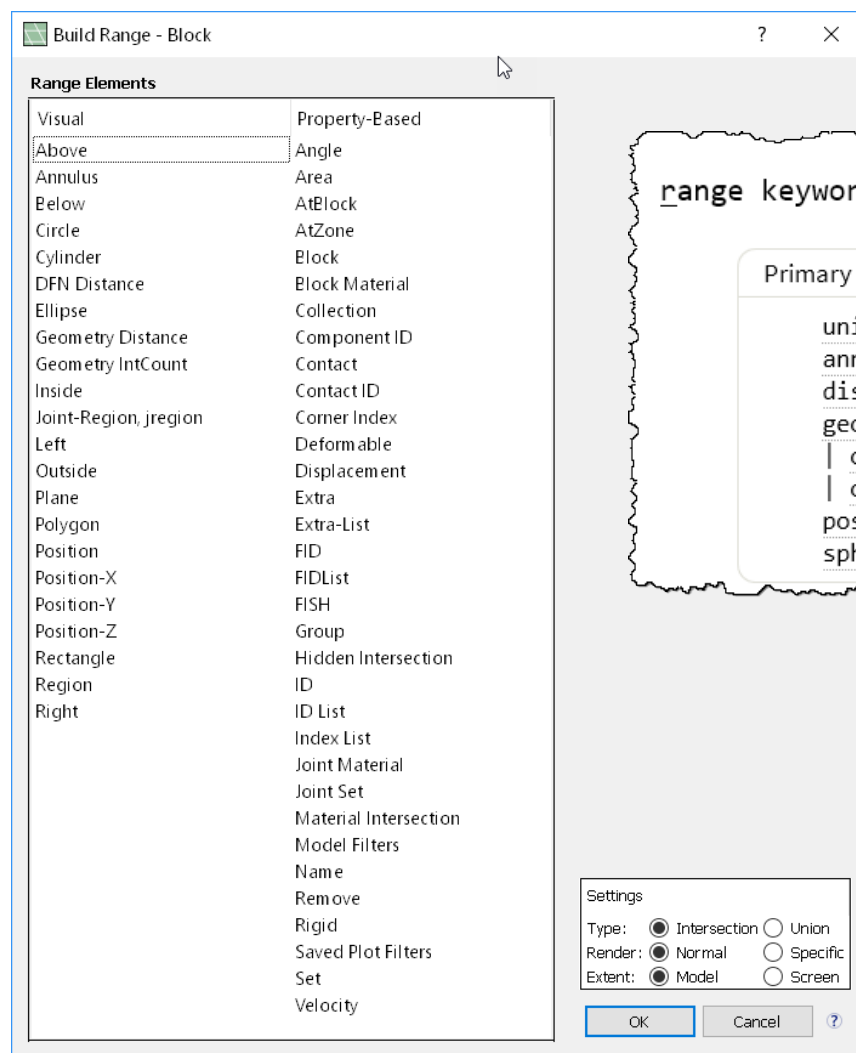
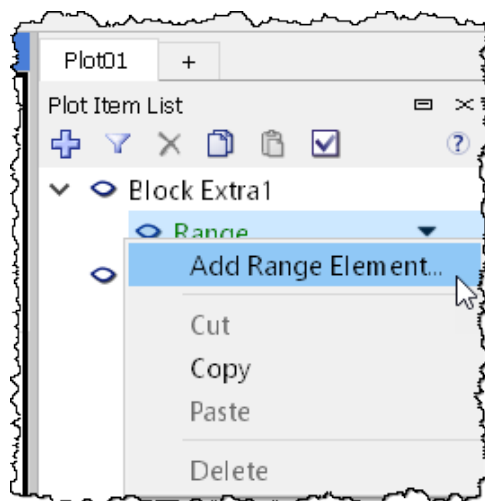
Enhanced Plotting



Example Plots



Enhanced Range Logic

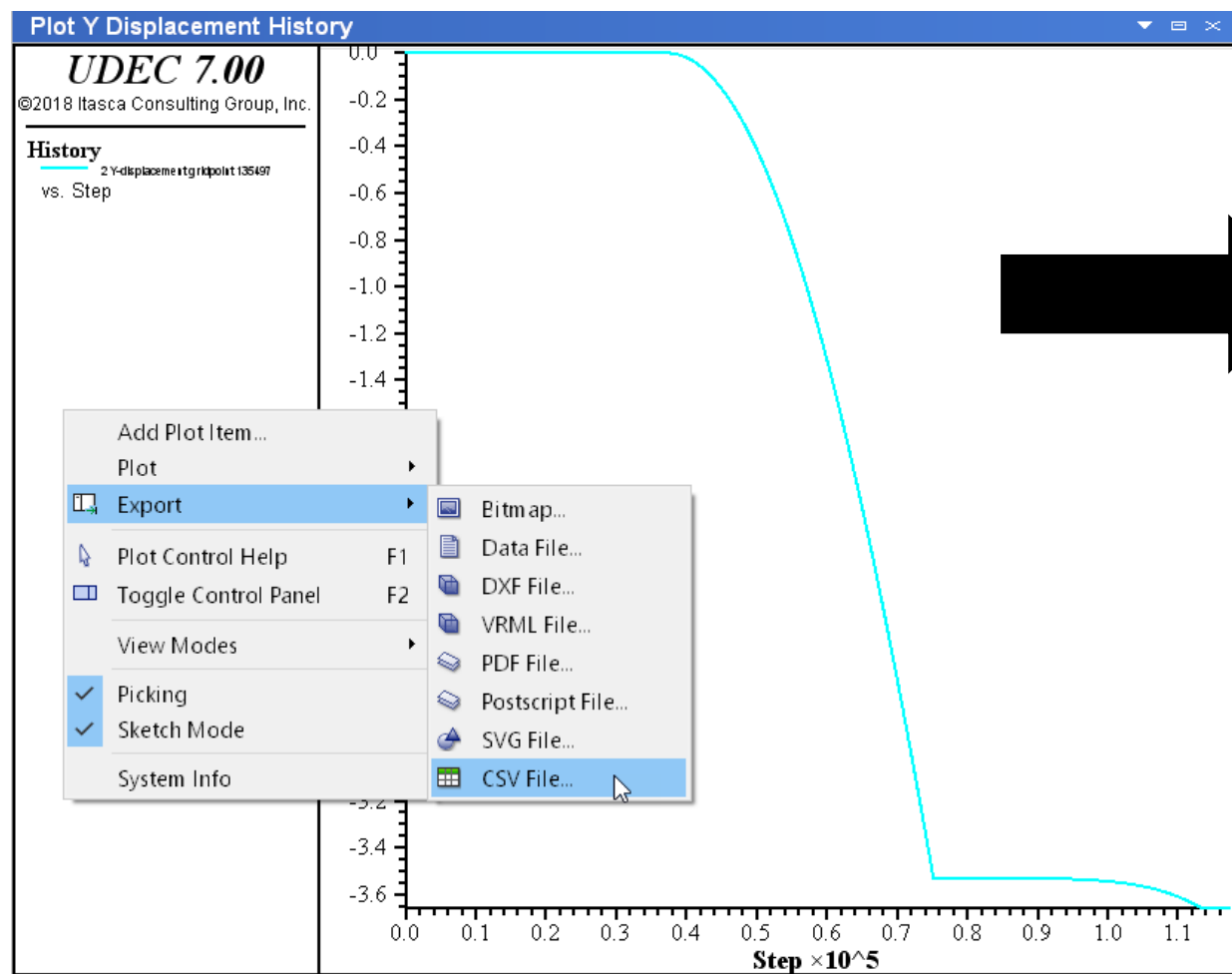


range keyword ...

Primary keywords:

union | use-hidden | selected | deselected | by | not | extent |
 annulus | component-id | cmodel | cylinder | dfn | aperture |
 distance | name | ellipse | extra | extra-list | fish |
 geometry-distance | geometry-space | count | direction | inside
 | outside | set | group | id | id-list | interface | named-range
 | orientation | plane | polygon | position | position-x |
 position-y | position-z | project-range | rectangle | seed |
 sphere | state | structure-type | surface

Export Images and Chart Data



Microsoft Excel ribbon: File, Home, Insert, Page Layout, Formulas, Data, Review, View

Clipboard: Cut, Copy, Paste, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Color, Background Color

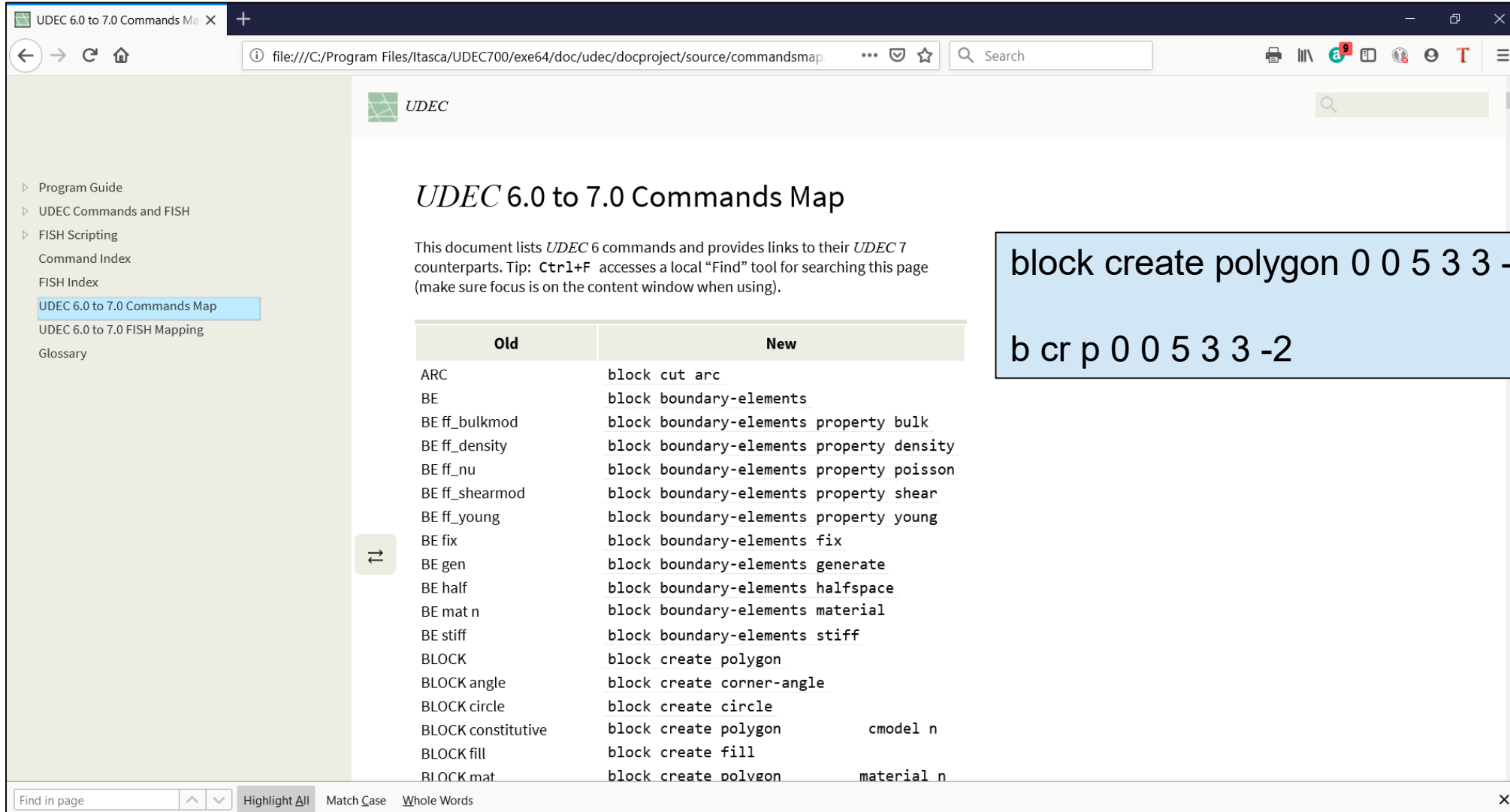
Alignment: Left, Center, Right, Indent, Decrease Indent, Increase Indent, Wrap Text, Merge & Center, Unmerge Cells

| | A | B |
|----|-------------------------------------|-------------------------------------|
| 1 | x 2 Y-displacement gridpoint 135497 | y 2 Y-displacement gridpoint 135497 |
| 2 | 0.00E+00 | 0.00E+00 |
| 3 | 1.00E+01 | -5.63E-07 |
| 4 | 2.00E+01 | -2.09E-06 |
| 5 | 3.00E+01 | -4.53E-06 |
| 6 | 4.00E+01 | -7.91E-06 |
| 7 | 5.00E+01 | -1.24E-05 |
| 8 | 6.00E+01 | -1.78E-05 |
| 9 | 7.00E+01 | -2.42E-05 |
| 10 | 8.00E+01 | -3.12E-05 |

DEMO



Updated Command Syntax



UDec 6.0 to 7.0 Commands Map

This document lists *UDec* 6 commands and provides links to their *UDec* 7 counterparts. Tip: **Ctrl+F** accesses a local “Find” tool for searching this page (make sure focus is on the content window when using).

| Old | New |
|--------------------|---|
| ARC | block cut arc |
| BE | block boundary-elements |
| BE ff_bulkmod | block boundary-elements property bulk |
| BE ff_density | block boundary-elements property density |
| BE ff_nu | block boundary-elements property poisson |
| BE ff_shearmod | block boundary-elements property shear |
| BE ff_young | block boundary-elements property young |
| BE fix | block boundary-elements fix |
| BE gen | block boundary-elements generate |
| BE half | block boundary-elements halfspace |
| BE mat n | block boundary-elements material |
| BE stiff | block boundary-elements stiff |
| BLOCK | block create polygon |
| BLOCK angle | block create corner-angle |
| BLOCK circle | block create circle |
| BLOCK constitutive | block create polygon cmodel n |
| BLOCK fill | block create fill |
| BLOCK mat | block create polygon material n |

block create polygon 0 0 5 3 3 -2

b cr p 0 0 5 3 3 -2

Find in page: Highlight All Match Case Whole Words

An Example

UDEC 6 Commands

```

1 config
2 round 5E-3
3 edge 1E-2
4 block 0,0 0,5 5,5 5,0
5 gen edge 1.0
6 group zone 'elastic'
7 zone model elastic density 1E3 bulk 1E8 shear 3E7 ...
& 8   range group 'elastic'
9 boundary xvelocity 0 range -0.1,5.1 -0.1,0.1
10 boundary yvelocity 0 range -0.1,5.1 -0.1,0.1
11 boundary xvelocity 0 range -0.1,0.1 -0.1,5.1
12 boundary xvelocity 0 range 4.9,5.1 -0.1,5.1
13 struct rockbolt begin 2.5,5.0 end 2.5,2.5 seg 3 prop 1
14 struct prop 1 cs_scoh 1E20 cs_sstiff 1E9 e 1E10 ...
&15   density 4000 radius 1 spacing 2 yield 1E20 ycomp 1E20
16 struct node 1 load 0.0,1000000.0 0.0
17 solve ratio 1.0E-5

```

UDEC 7 Commands After Conversion

```

1 block config
2 block tolerance corner-round-length 5E-3
3 block tolerance minimum-edge-length 1E-2
4 block create polygon 0 0 0 5 5 5 5 0
5 block zone generate edge 1.0
6 block zone group 'elastic'
7 block zone cmodel assign elastic density 1E3 bulk 1E8 shear 3E7 ...
& 8   range group 'elastic'
9 block gridpoint apply velocity-x 0 range position-x -0.1 5.1 position-y -0.1 0.1
10 block gridpoint apply velocity-y 0 range position-x -0.1 5.1 position-y -0.1 0.1
11 block gridpoint apply velocity-x 0 range position-x -0.1 0.1 position-y -0.1 5.1
12 block gridpoint apply velocity-x 0 range position-x 4.9 5.1 position-y -0.1 5.1
13 block structure rockbolt create begin 2.5 5.0 end 2.5 2.5 segment 3 material 1
14 block structure rockbolt property 1 coupling-cohesion-shear 1E20 ...
&15   coupling-stiffness-shear 1E9 young 1E10 density 4000 radius 1 ...
&16   spacing 2 yield-tension 1E20 yield-compression 1E20
17 block structure beam node force 0.0 1000000.0 0.0 range id 1
18 block solve ratio 1.0E-5

```

Updated *FISH* Syntax

UDEC 6.0 to 7.0 *FISH* Mapping

The mapping of *FISH* function names from version 6.0 to version 7.0 are grouped by kind: General, block, boundary (apply), contacts, corners, domains, gridpoints, properties, thermal, zone.

| Old | New |
|-----------------|------------------------------------|
| General | |
| block_head | block.head |
| bou_head | block.boundary.head |
| bou_near | block.boundary.near |
| b_near | block.near |
| cable_elem_head | block.structure.cable.element.head |
| cable_node_head | block.structure.cable.node.head |
| cf_axi | block.config.axisymmetry |
| cf_cell | block.config.cell |
| cf_creep | block.config.creep |
| cf_fluid | block.config.fluid |
| cf_p_stress | block.config.pstress |
| cf_thermal | block.config.thermal |
| contact_head | block.contact.head |
| cor_near | block.corner.near |
| crtel | block.creep.timestep |
| crtime | block.creep.time.total |

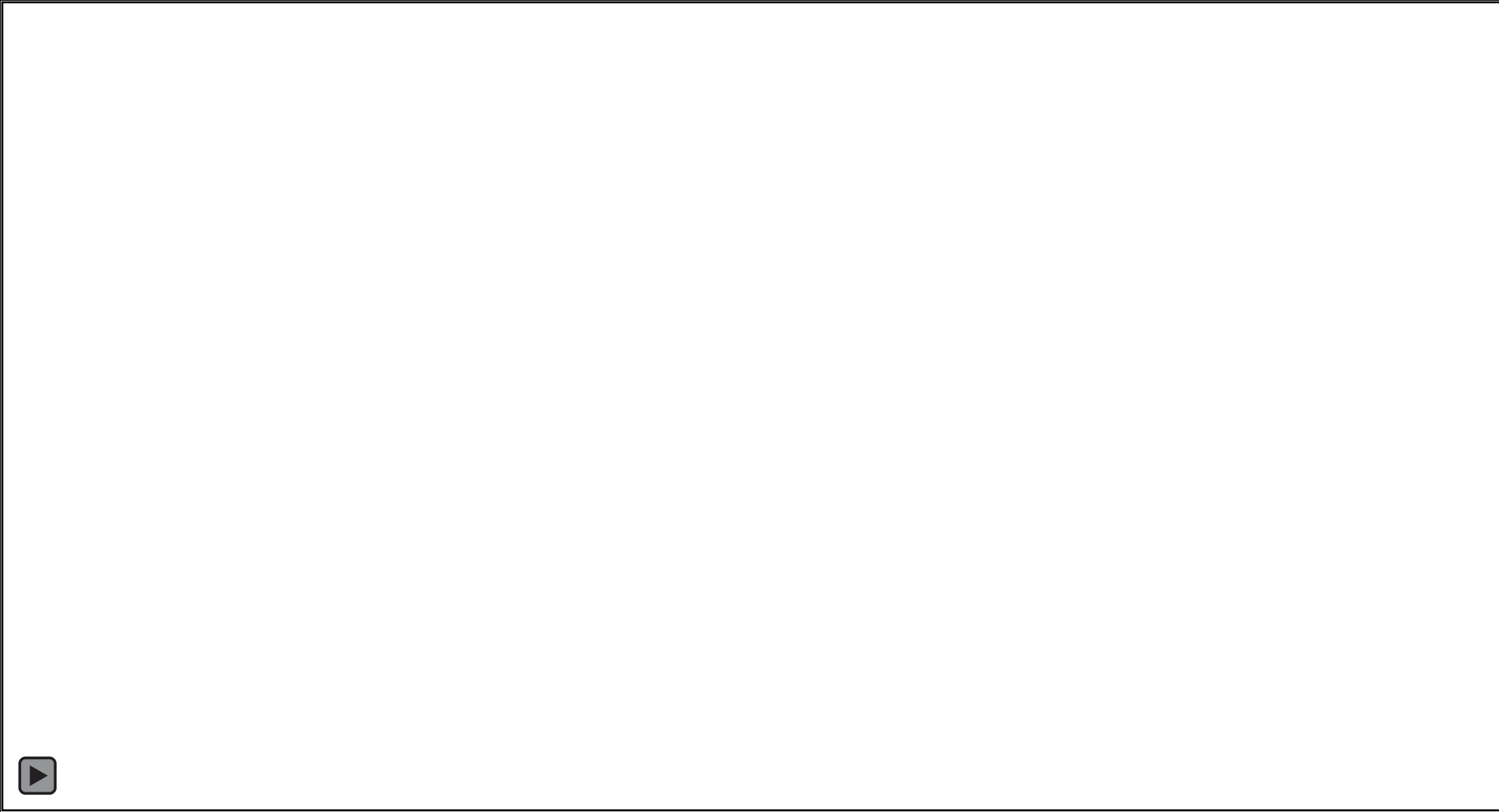
Some new *FISH* functions:

- Data labels, scalars, vectors, tensors
- Email functions
- Distance between point/segments/triangles
- Matrix math (transpose, inverse)
- System utilities
- Strings (length, lower, sub-string)

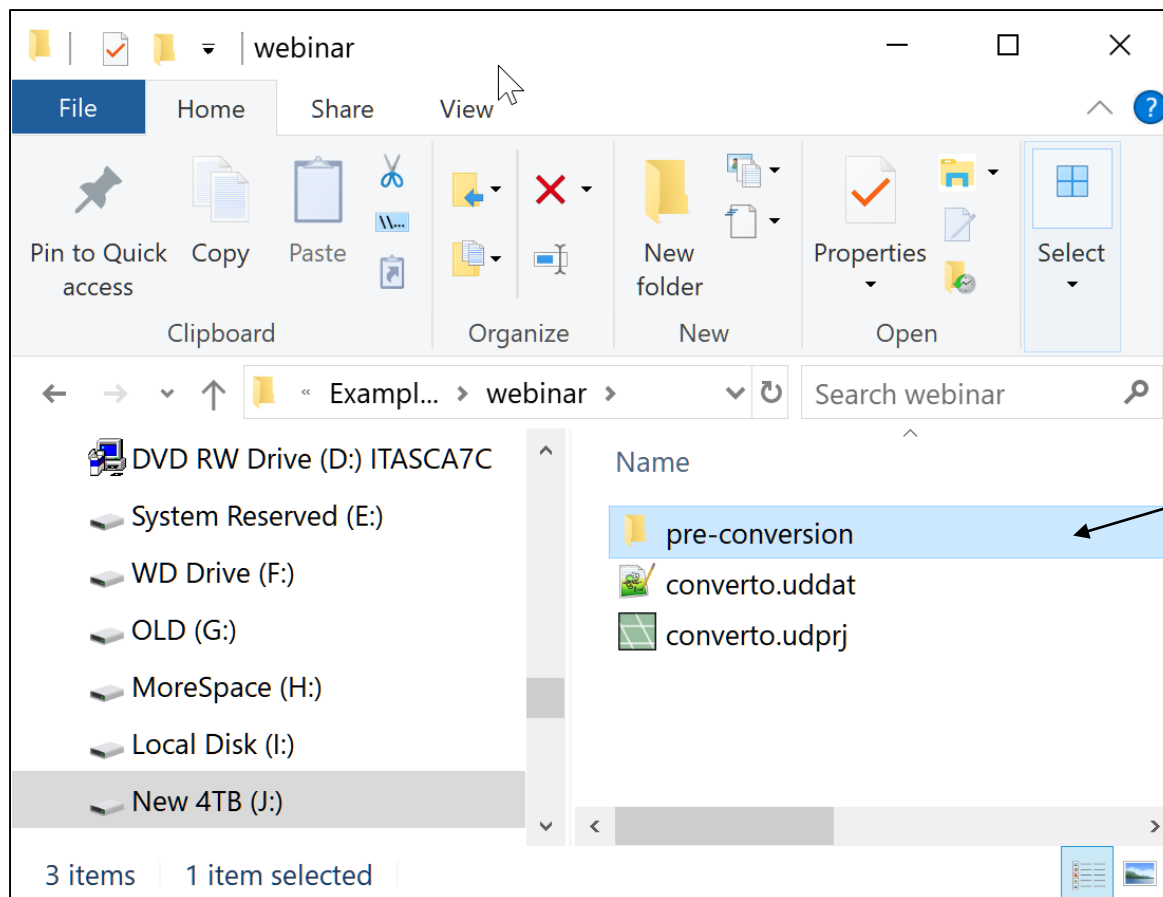
Inline *FISH*

- $[abc = \text{math.pi} * R^{2.0}]$
- Block zone generatre edge $[5.*\text{rounds}]$

Command Conversion Tool



Command Conversion Tool



Original version is
retained automatically

Built-in Text Editor

The screenshot displays the UDEC 7.00.34 interface with the built-in text editor open to the file `stress-init.uddat`. The editor shows a model setup script with several annotations:

- Inline FISH**: An arrow points to the line `[round_length = 1./10]`, indicating that inline FISH code is supported.
- Continue on next line**: An arrow points to the line `block cut crack (-2,-2) (-2,2)`, indicating that commands can span multiple lines.
- BUG**: A red box highlights the text `BUG` in the command `block mechanical gravity = 0.0,[e_grav])` on line 21.

The console window at the bottom shows the execution of the model setup, including the command `udc> block mechanical gravity = 0.0,[e_grav])` and the resulting error message:

```

*** Unused extra parameter 6 (BUG) found on command line.
While processing line 21 of file J:/marketing/Software/UDEC 700/Examples/stress-init/stress-init.uddat.

```

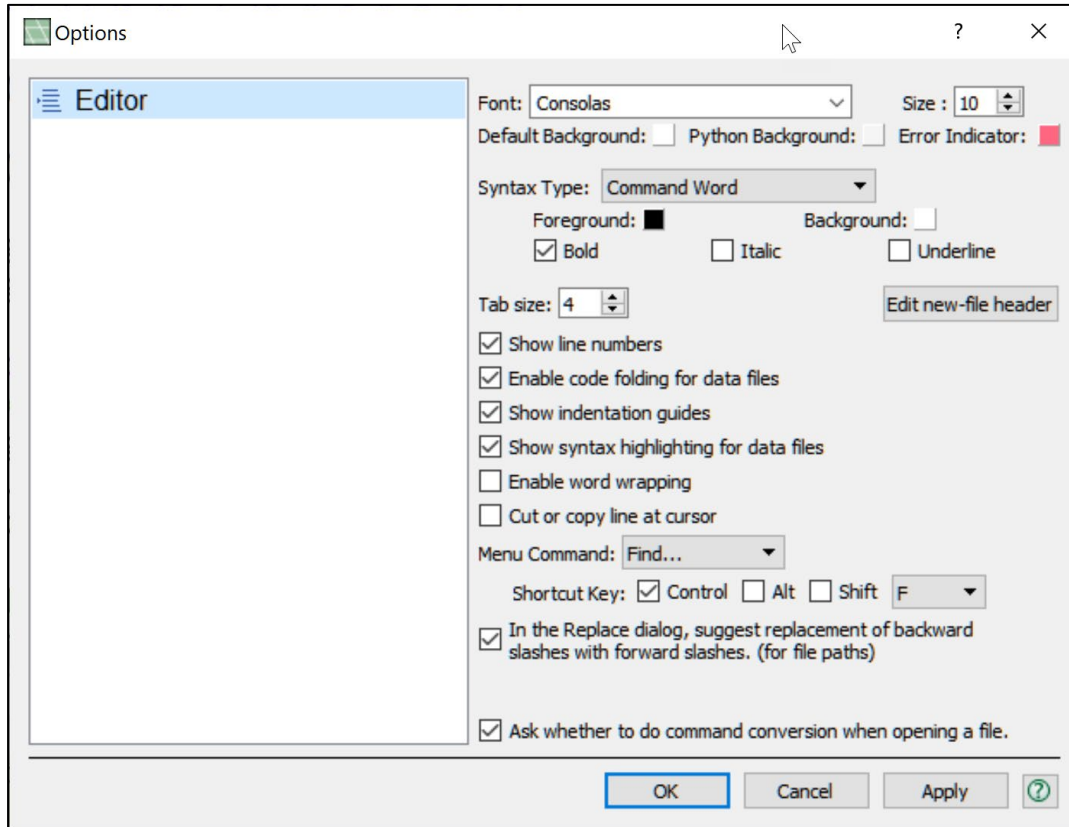
Two inset windows show the **FISH Global Symbols** table:

| Name | Value | Type | F (# |
|--------------|---------------|------|-------|
| Ar | 8.494867e+01 | real | - |
| e_grav | -9.810000e+00 | real | - |
| rad_ | 5.200000e+00 | real | - |
| round_length | 1.000000e-01 | real | - |

The **FISH global symbols** window is also shown in a separate inset, displaying the same table.

Line 21 Column 46: CTRL+Space for Inline Help; F1 for Help

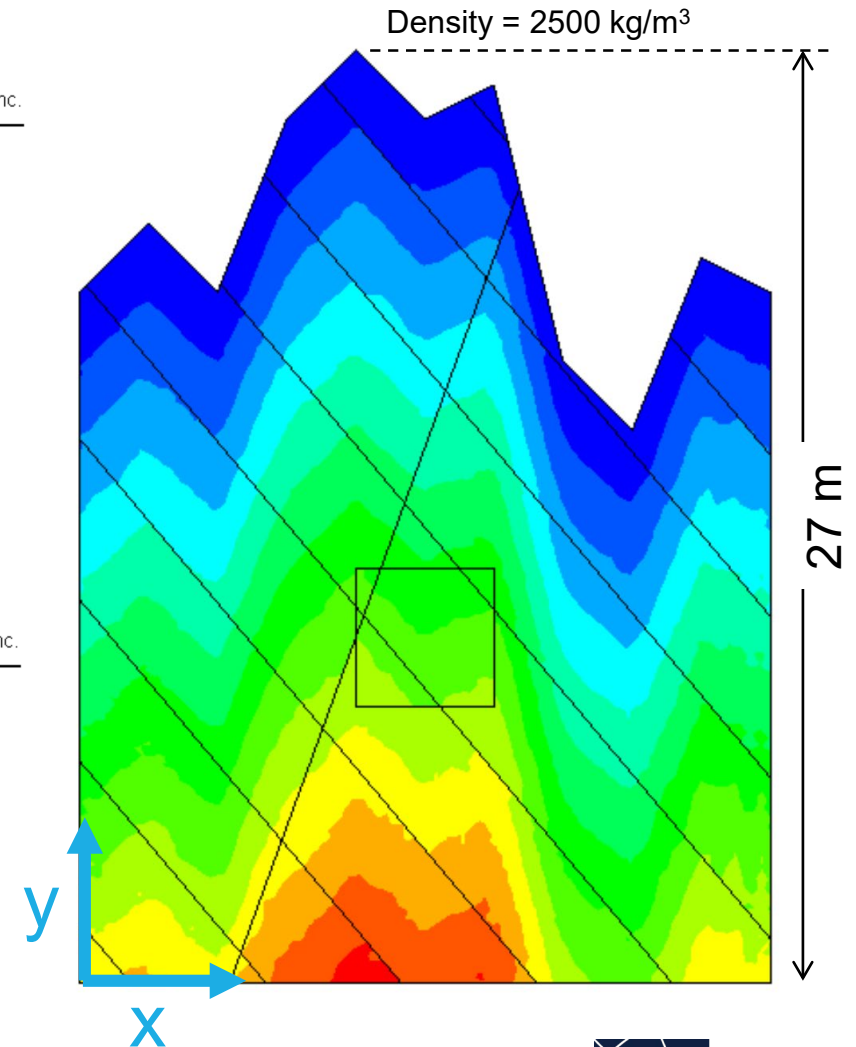
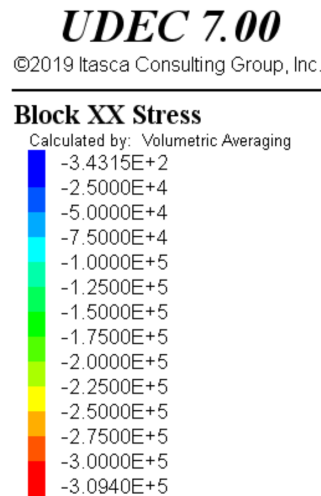
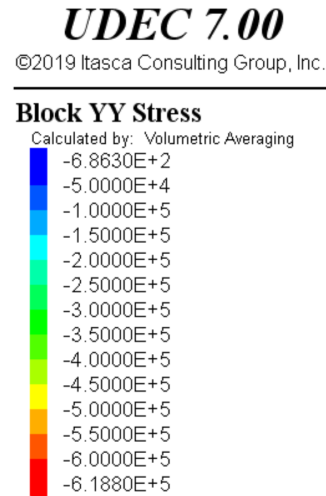
Built-in Text Editor Tools and Options



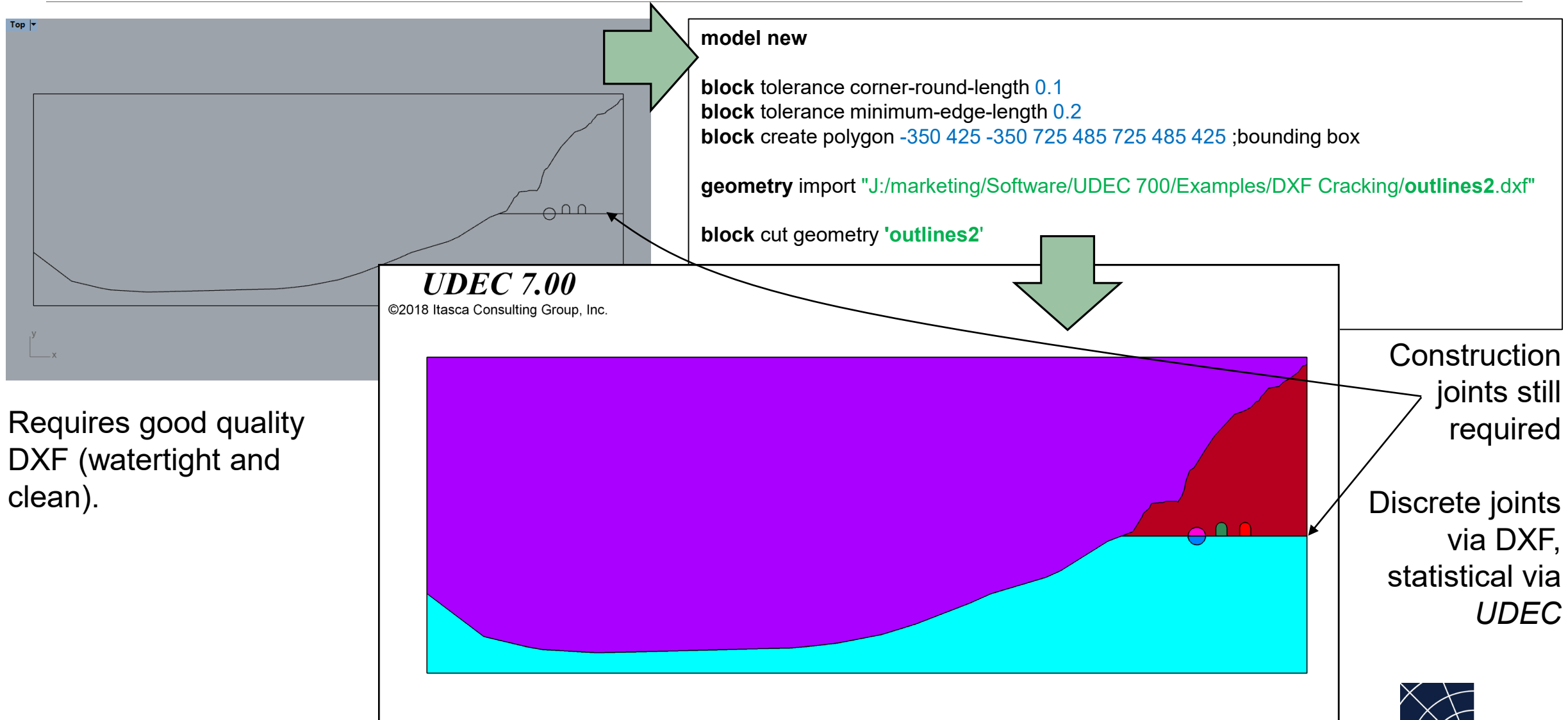
New Construction Tools – Topographical Stress

- Insitu stress command
- Gravity and material densities must be defined prior to use
- k_0 may be specified
- No manual calculations necessary
- *FISH* function not needed
- No cycling required upfront

block insitu stress-topography kox 0.5 koz 0.25



Model (Crack) Generation from DXFs



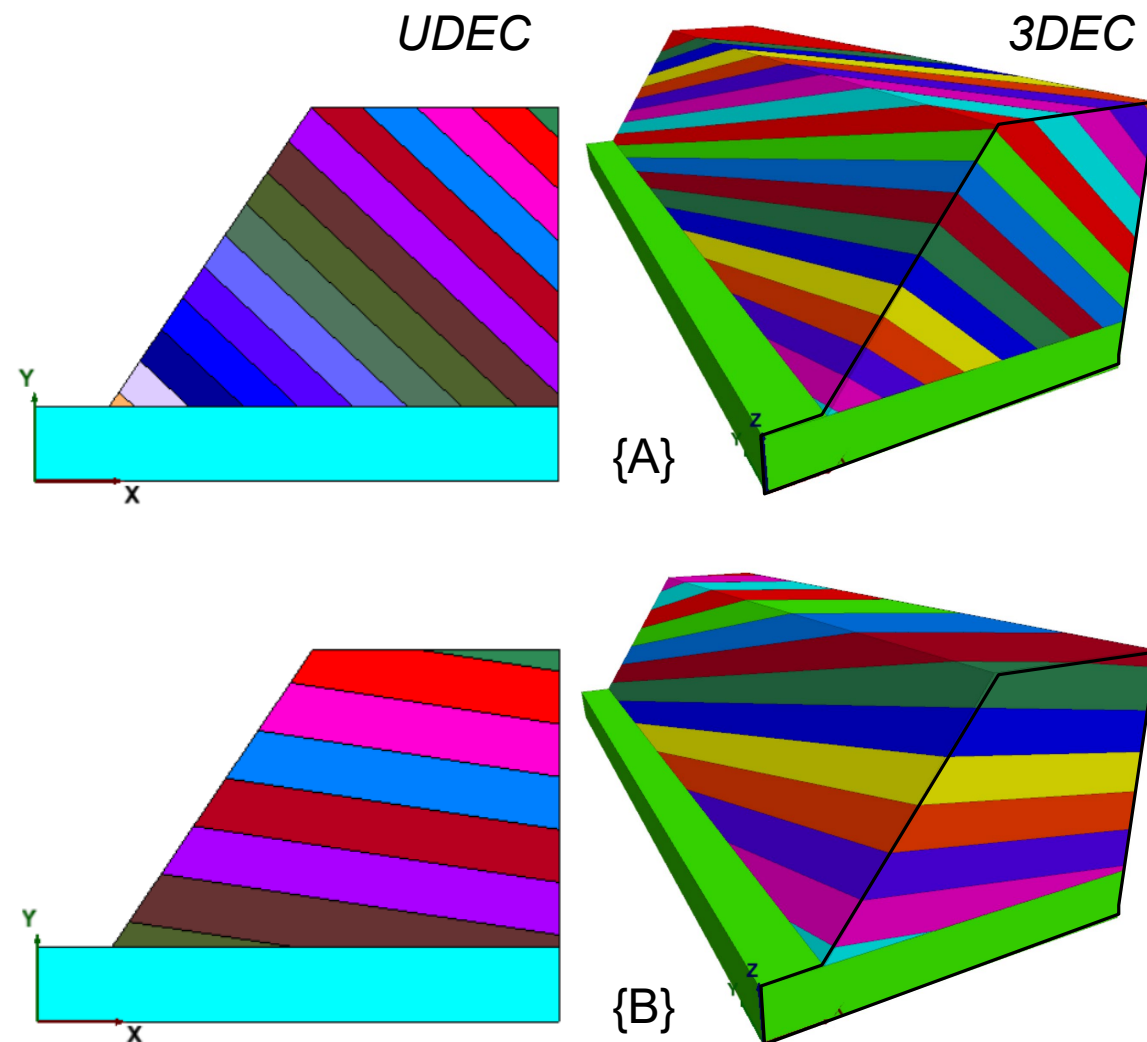
3D Joint Generator

- *UDEC* 6 uses angle keyword to specify orientation of jointing
- *UDEC* 7 allows specification of the *UDEC* model plane in 3D space
- Use Origin, Dip and Dip-Direction keywords to specify joint orientation

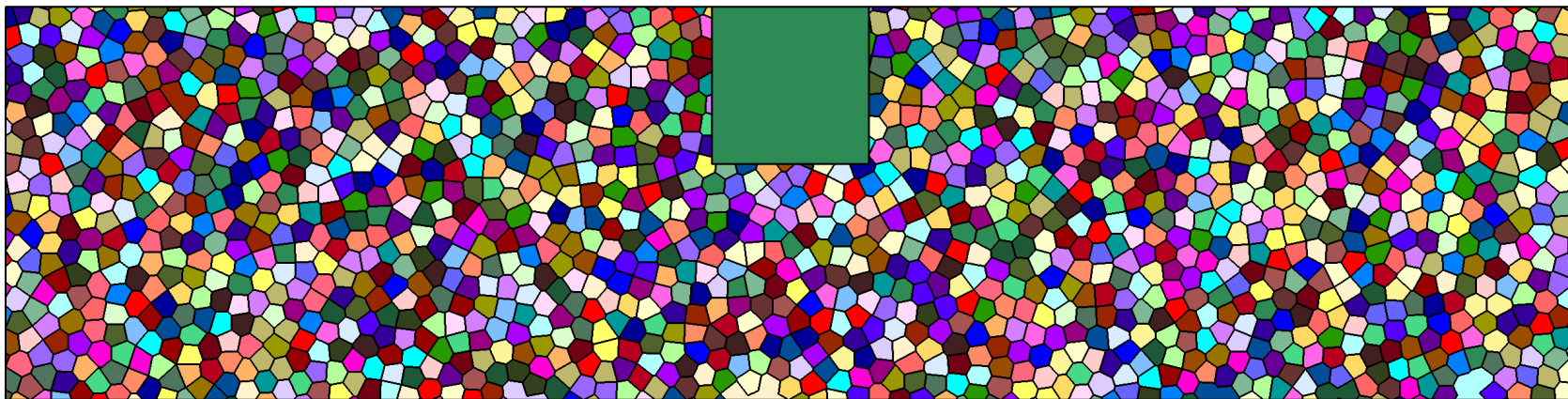
model orientation dip-dir 0 or 0 0 0

{A} block cut joint-set dip 45 dd 70 space 5 or 0 0

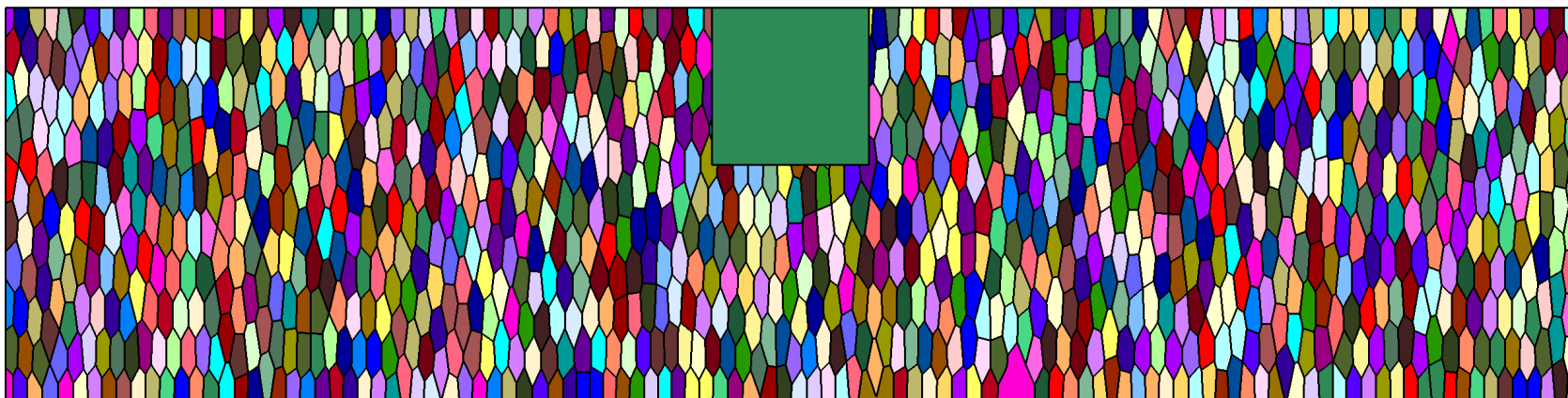
{B} block cut joint-set dip 15 dd 35 space 7 or 0 0



Asymmetric Voronoi Generation



Aspect Ratio = 1



Aspect Ratio = 0.33

Voronoi (trigon) blocks are useful for Bonded Block Modeling (BBM) of intact rock).

Rock Support Database [GIIC]

Rock material list

Selection

1: Swellex:25.4 mm Swellex

Edit Database

Constitutive model

Rockbolt element [Help on Model](#)

Material name

Class Swellex

Name 25.4 mm Swellex

PropID 1

Geometric Mechanical

Elastic

Young's modulus 2E11

Density 6.44E3

Plastic moment

☐ Use elastic solution

Plastic moment

Element yield

Tensile yield strength 2.28E5

Compress yield strength 2.28E6

Tensile failure strain 0.1

Coupling-spring constants

Normal

Stiffness 3.19E12

Cohesive strength 3.99E3

Friction angle 0

Shear

Stiffness 3.19E12

Cohesive strength 3.99E3

☐ Cohesion reduction table

Friction angle 0

☐ Friction reduction table

Perimeter 8E-2

☐ Confining stress factor table

Thermal

Thermal expansion

Create

Clone

Copy-> Database

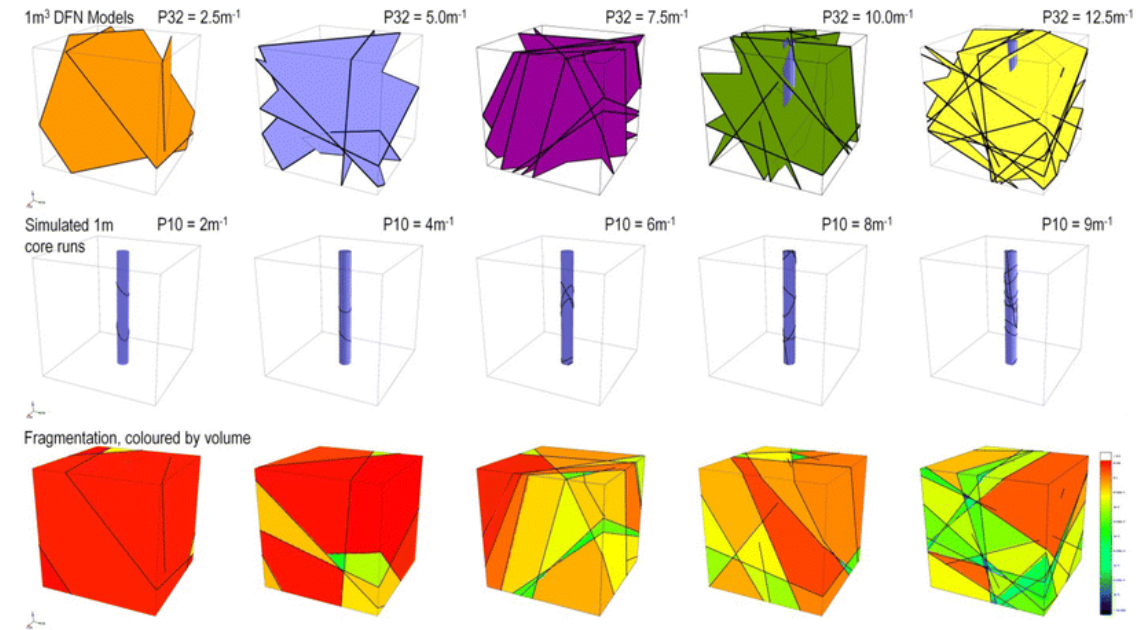
Delete

Apply Reset

OK Cancel Help

Fracture Generation (Statistical)

- Fracture template create
- Parameters are the size distribution, the position distribution, and the orientation distribution.
- Fracture generation
 - ❖ Fractures are generated until a specified stopping criterion is met. These conditions include:
 - a target fracture number (fracture-count);
 - a target P_{10} measured along either one or more scanlines;
 - a target density (P_{21} in 2D; P_{32} in 3D) (mass-density);
 - a target percolation volume (percolation);
 - DFN at the connectivity threshold (connectivity-threshold); and
 - user-defined criteria (fish-stop).



Rogers, S., Elmo, D., Webb, G. et al. Rock Mech Rock Eng (2015) 48: 633. <https://doi.org/10.1007/s00603-014-0592-y>

Fracture Generation

- **Fracture combine**

- ❖ Simplify fractures using reference fractures based on smaller fractures' relative angle and/or distance
- ❖ Prevent small angles between fractures, which can improve meshing

- **Fracture import** available

- ❖ Several Itasca formats
- ❖ 3D Fracman format
- ❖ From *UDEC* geometry

DFN Example

```

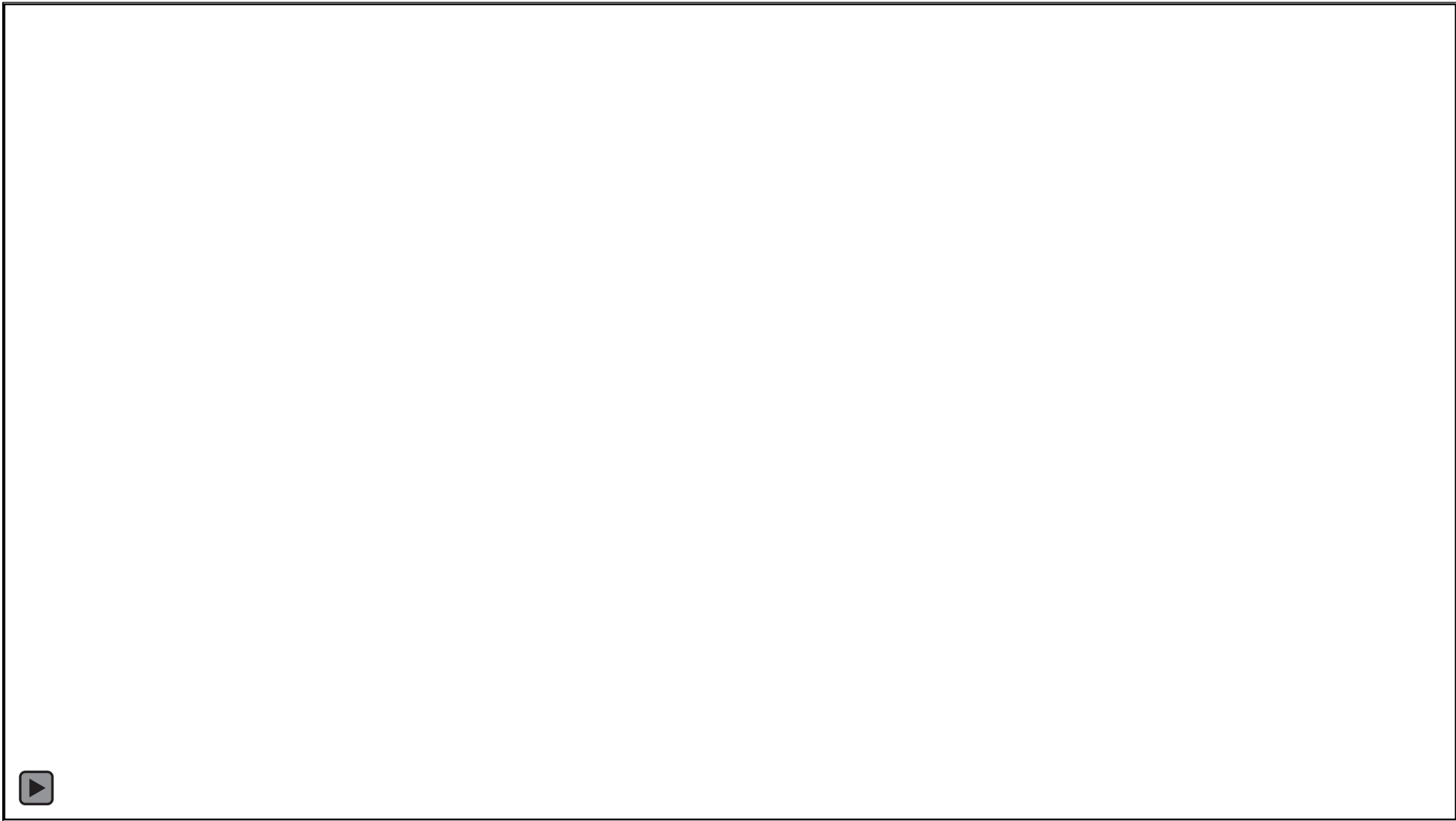
; create fracture template specifying size distribution.
; orientations will be uniformly distributed by default
fracture template create 'example' size power-law 3 size-limit 1 100

; create one instance of a DFN within a defined box at a defined density (P10)
fracture generate template 'example' dfn 'fractures-1' gen-box -4 4 -8 8 p10 1.5 begin (-4,3.5) end (4,-3)

; merge fractures if they are sub-parallel (simplify fractures)
fracture combine angle 30.0 distance 1.0 merge
fracture combine angle 40.0 distance 1.0 merge

; cut fractures
block cut dfn 'fractures-1'

```



New Data Querying Tools



Interactive Help and Traditional Manual (slide added after webinar)



1. Interactive online Help now available for *FISH* & Commands
2. Traditional manual (PDF) available for background
3. Example data files may be loaded

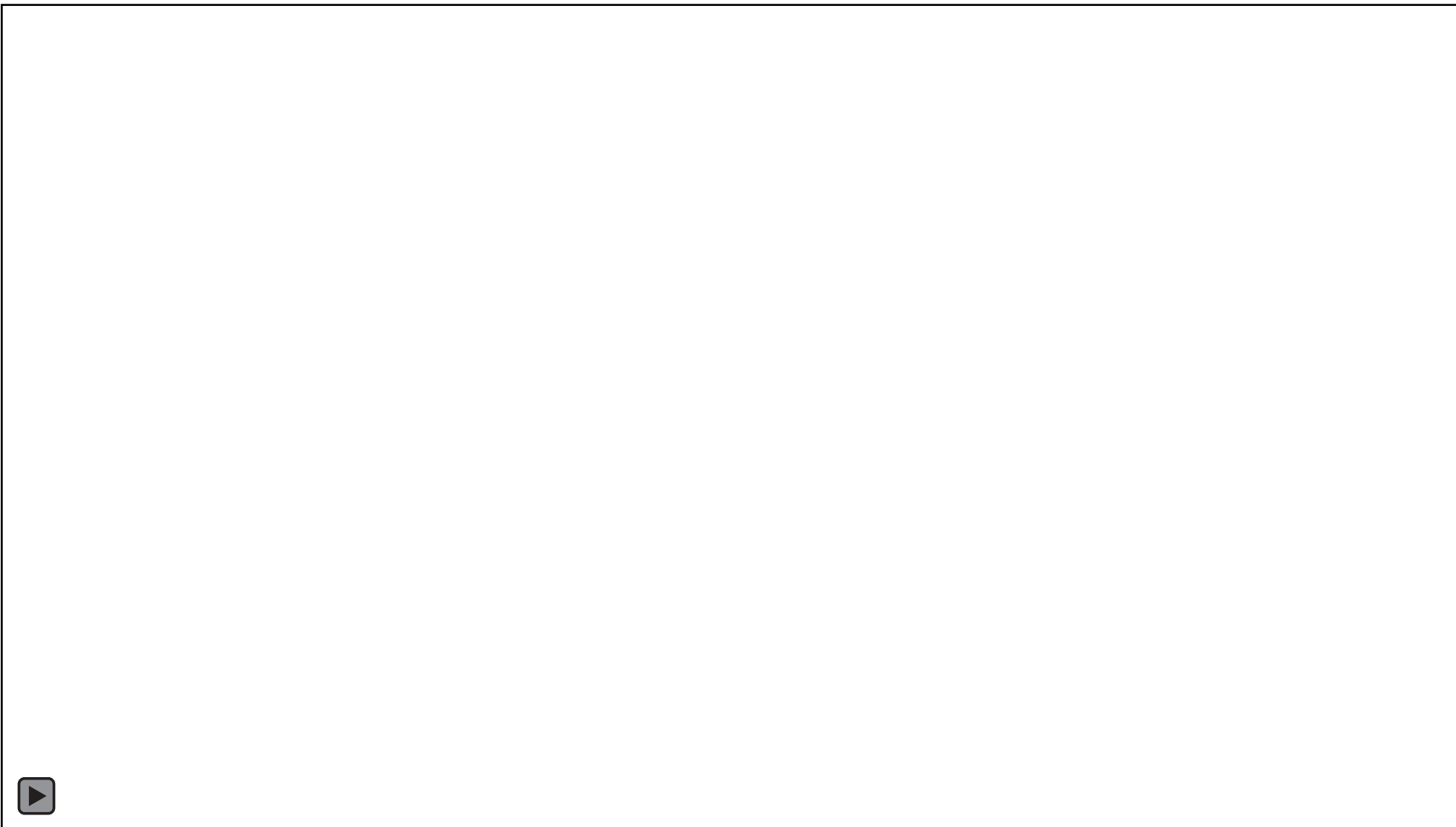


F1-key Help (slide added after webinar)



- Use the F1-key in a data file or command line to reference the online Help.

Technical support dialog (slide added after webinar)



- Use the built-in dialog form to ask technical questions, report bugs, or request features.
- Messages are routed to your regional software agent.

and more, including ...

- Eliminated save file incompatibility for future versions
- Up to 128 extra variables for all objects (blocks, zones, grid points, structural elements, etc.)
- Expand use of color for existing plots
- Expanded plotting of structural element results
- Track command to track blocks, zones, & grid points
- Automatic brick generator
- Failure states for all contact (joint) models
- Automatic stress initialization based on a stress measurement

Thank You

Questions/Comments?

Question 1a

Is there a scale box plot-item?

Scale box plot-item?

- No, there is currently not a scale-box plot item
- This is on the development list
- The GLIC flavor of *UDEC* still retains this plot-item if it is important for your plots
- A *FISH* function could be written to generate these plot-items using a combination of geometry (nodes, lines, polygons) and text labels.

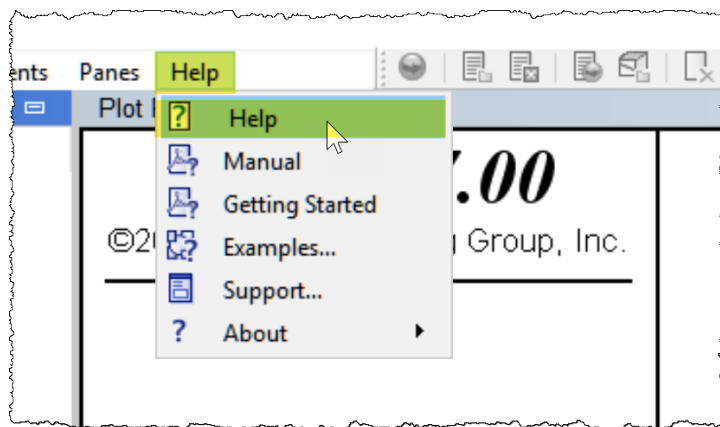
Question 1b

How to script plot-items?

To see how plot-item commands are scripted ...

1. Refer to *Plot Commands* in the online Help;
2. Use “?” in the command line; or
3. Export existing plot(s) as data files to see command structure and reuse snippets.

(1) Primary plot-items and attribute switches/keywords are available in HELP



plot item command — UDEC 7

file:///C:/Program Files/Itasca/UDEC700/exe64/doc/common/gui/module/doc/manual/plot/cmd_plot.item

UDEc

plot item command

Syntax

`plot <s> <i> keyword`

Create, destroy, or modify plot items associated with the plot. If a plot name `s` is not specified, the current view is assumed.

The available keywords are:

`create keyword ...`

adds a new plot item to the list associated with the plot. An alphabetical list of keywords, matched to the items available from the Build Plot dialog, is shown below. Note that additional plot items can be added by plug-ins to the system at any time.

`delete i`

destroys the `i`th plot item in the list associated with the current plot. Note that this will renumber the plots following that in the list.

`modify i keyword ...`

allows modification of the existing plot item at the `i`th position in the list associated with the current plot.

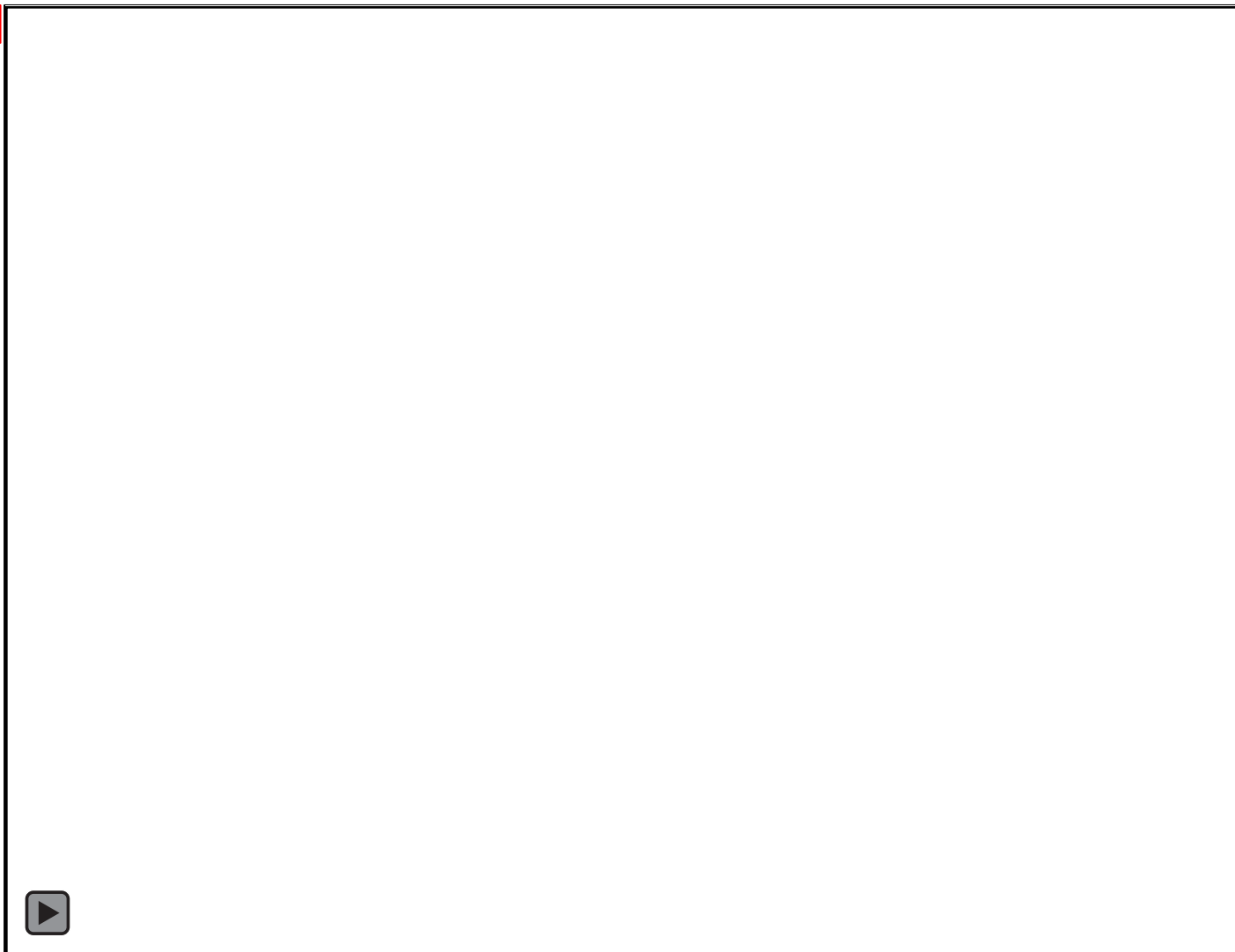
Warning

The plot items listed below may be configured through a wide variety of keywords that control various aspects of item's appearance. Those keywords are not documented here. Instead, the syntax is available by inspection of the results of a plot export to data file (see Command-Driven Plotting Workflow).

Table 1: Plot Items by Keyword (for use with `plot item create`)

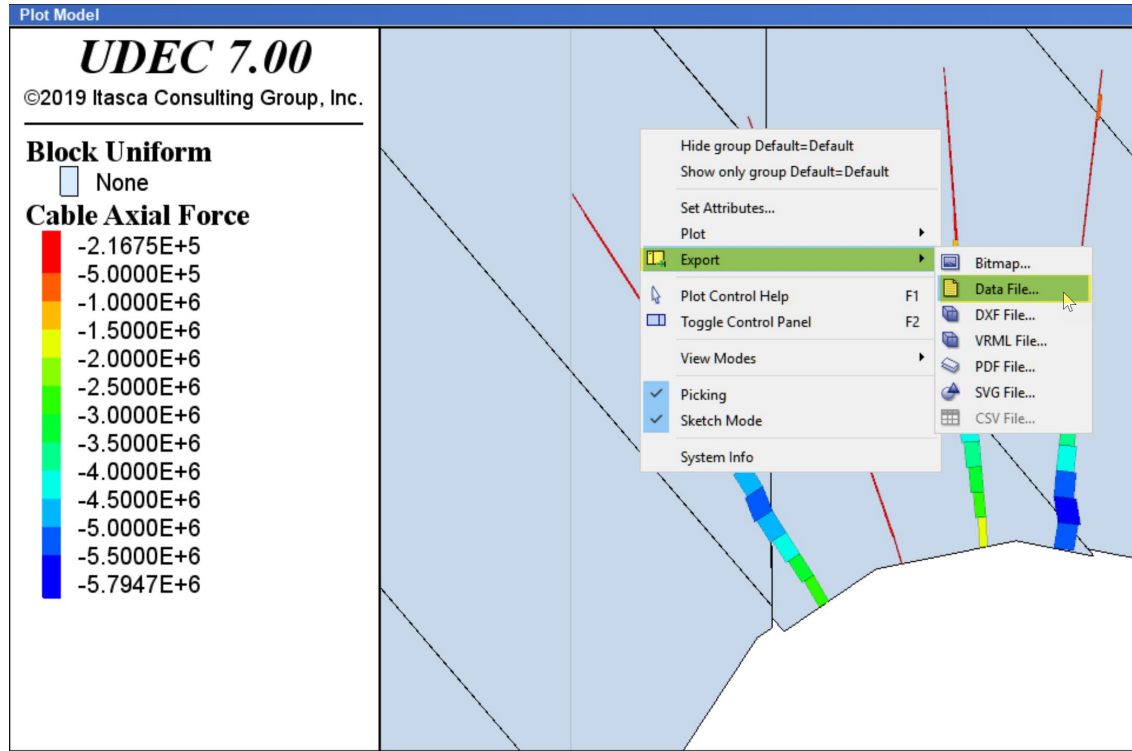
file:///C:/Program Files/Itasca/UDEC700/exe64/doc/common/gui/module/doc/manual/plot/cmd_plot.item.html

(2) Prompt options using “?” in the command line



- **HINT:** You can display the previous command(s) issued in the command line using F3-key or the up-arrow-key.

(3) Export plots as data files



Right-click on plot

```

1 plot create
2 plot clear
3 plot active on
4 plot background 'white'
5 plot outline active on width 2 color 'black'
6 plot legend active on heading color 'black' copyright color 'black' ...
7 placement left size 25,50 ...
8 step active off ...
9 time-real active off ...
10 time-model active off ...
11 title-customer active off ...
12 view-info active off
13 plot title-job active off
14 plot title active off
15 plot view extent (-10.745,2.9945) (7.1239,20.743)
16 plot item create block active on label uniform color-list global off clear ...
17 label "None" color 'xlightskyblue' ...
18 polygons fill on outline active off ...
19 polygon-transparency 0 ...
20 outline-transparency 100 lighting on offset 0.5 2 ...
21 zonelines color-list global on clear ...
22 label "junk" color 'cyan' ...
23 polygons fill off outline active off ...
24 polygon-transparency 0 ...
25 outline-transparency 50 lighting on offset 0.5 2 ...
26
36 text size 10 family 'Times New Roman' style normal ...
37 uniform-color off ...
38 color-list global off clear
39 plot item create cable active on contour value aforce ...
40 ramp rainbow ...
41 minimum automatic maximum automatic interval automatic ...
42 reversed off above automatic below automatic ...
43 line width 2 style solid thick off ...
44 mark ...
45 mark type hourglass ...
46 pixel-size 5 ...
47 color-list global on clear ...
48 bars polygons fill on outline active on width 1 color 'black' ...
49 polygon-transparency 0 ...
50 outline-transparency 80 lighting off offset 0.5 2 ...
51 cut-line width 1 ...
52 barscale 0.05 ...
53 ...
54 legend active on ...
55 plot_title active on text "" size 55 family 'Times New Roman' style bold color 'black'
56 plot item create cable active off label property property-name cb sbond color-list global off clear ...

```

← Cable plot-item command

Cable plot-item
attributes
(defaults used if
not specified)

Data file with all plot commands, attributes, and settings
will be generated in the *UDEC* text-editor.

Question 2

Are inline *FISH* variables global or local variables?

Inline *FISH* global or local variables?

- Inline *FISH* variables are global by default. [abc = 3.14 * 9.23]
- What are local variables?
 - ❖ Creates a local variable named “name.” From this point until the end of the function (the end statement), this variable will supersede any existing global symbol with the same name. The variable is only available inside the function, and ceases to exist once the function has completed execution. A separate copy of the variable is created for each function execution.

```
DEF acalc
  local abc = 3.14 * 9.23
END
[acalc]
```

- What are global variables?
 - ❖ Explicitly creates a global symbol name, if one does not already exist. By default, this is done by *FISH* automatically when an unrecognized name is encountered.

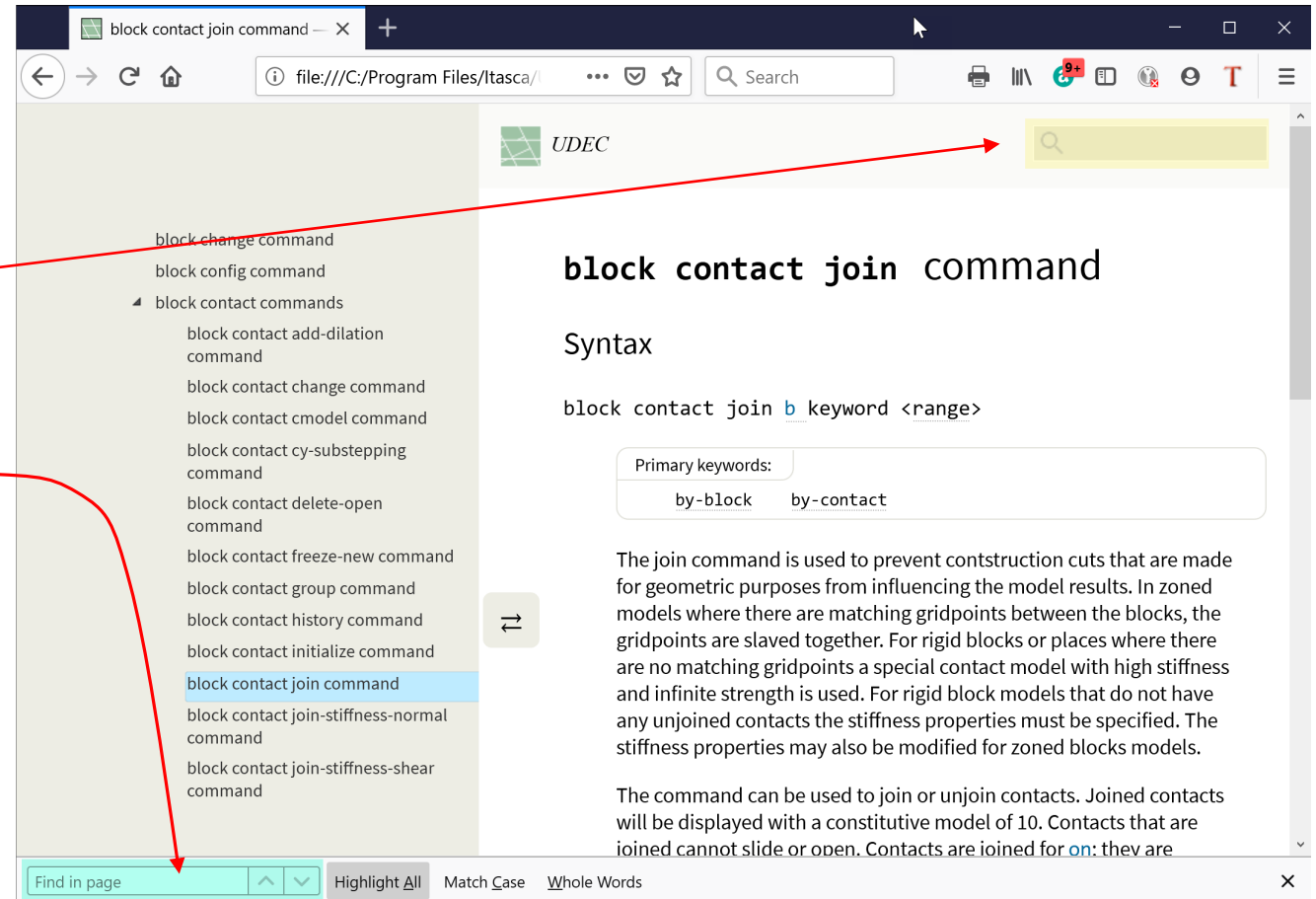
```
DEF acalc
  global abc = 3.14 * 9.23
END
[acalc]
```

Question 3

Find Tools

Is there a find tool in “pages”?

- Assuming this is referring to the Help pages, there are two options:
 - Index search (top, right-hand-side of Help pages) and;
 - Find tool (browser's built-in find too: CTRL + f-key).
- There is also a search/search-replace tool in the text-editor for data files



Question 4

Modeling Faults

How to model a fault in *UDEC*?

1. Indirectly as zones, along the fault orientation, with different (weaker) properties from surrounding material (yielding and deformations are possible, but no sliding, separation, or closure along the fault).
2. By cutting the model into blocks and specifying the contacts between blocks to have fault properties. This represents a physical discontinuity such as a fault, contact plane, or interface between two different materials and sliding, opening, and closure is possible. Similar to an interface in *FLAC*.

❖ Several contact models are available in *UDEC*:

- Coulomb slip (area) contact model
- Continuously yielding contact model
- Coulomb slip (point contact) elastic model
- Coulomb slip with residual strength model
- Barton-Bandis contact model (optional)

block cut command

Syntax

block cut keyword <range>

Primary keywords:

| | | | | | | |
|-----|-----------|---------|-------|----------|---------|-----------|
| arc | crack | cutting | dfn | geometry | join | jointset- |
| id | joint-set | split | table | tunnel | voronoi | |

How to model fault seismic activity?

- Assuming seismicity due to slip on existing joints (distinguished from intact rock damage).
- All Itasca programs include the ability to consider pre-existing joints.
- How to get seismic information from slip on joints?
- Moment (M_0) calculated from shear modulus (μ), fault area (A) and fault slip (Δu).

$$M_0 = \mu A \Delta u$$

- Magnitude (M_w) calculated by

$$M_w = \frac{2}{3} \log M_0 - 6$$

For more information, refer to: Fry, M. F. et al. "Discrete Element Modelling of Microseismic Energy Associated with Hydraulic Fracturing in Natural Fractures Reservoirs," in Proceedings, 49th US Rock Mechanics/Geomechanics Symposium (ARMA, San Francisco, June 2015), [ARMA 15-0806](#). Alexandria, Virginia: ARMA, 2015

Example: 3DEC first approach

- “Frank” method
 - ❖ Consider each sub-contact a separate event location
 - ❖ Record total slip at each sub-contact over specified time intervals
 - ❖ Calculate magnitudes as above
 - ❖ **Variation:** Consider each *contact* an event and get average slip and total area over time interval
- **Advantage:** simple and fast
- **Disadvantages**
 - ❖ Magnitude strongly depends on time windows chosen
 - ❖ No spatial clustering (all events ~ same radius), or arbitrary spatial clustering (contact method)
- More complex, slower approaches have also been used that provide better temporal event definition or can differentiate between seismic and aseismic events.

Question 5

Particle-Particle, Particle-Wall Interactions, and Fluid Flow

Can particle-particle interactions and fluid flow be modeled?

- I am working on a flow application involving solid particles of different shapes. I would like to know if the DEM method in *UDEC* can be applicable to such fluid flows (suspension flow)? I would like to study the particle-particle and particle-wall interactions for jet polishing application.
- *UDEC* Contact Detection Option 1 (default): **Domain Logic**
 - ❖ *UDEC* takes advantage of a network of “domains” created by the 2D block assembly. Domains are the regions of space between blocks, which are defined by the contact points. Domains are also used for calculating fluid flow between blocks.
 - ❖ During one timestep, new contacts can only be formed between corners and edges within the same domain, so local updates can be executed efficiently whenever some prescribed measure of motion is reached within the domain.
 - ❖ The main disadvantage of this scheme is that it cannot be used for very loose systems as the domain structure becomes ill-defined.
- *UDEC* Contact Detection Option 2: **Cell Space Logic**
 - ❖ The space containing the system of blocks is divided into rectangular cells. Each block is mapped into the cell or cells that its “envelope space” occupies. Once all blocks have been mapped into the cell space, it is an easy matter to identify the neighbors to a given block (via linked-list addresses of all blocks).
 - ❖ This allows models with blocks that may bounce from one block to another (e.g., rock fall model or bin flow).
 - ❖ However, fluid flow is not available with the cell logic and the cell space approach is slower than the “domain” logic.
- Therefore, for this specific case it is recommended that you consider *PFC2D* (or *PFC3D*) rather than *UDEC*, likely also incorporating a CFD solver (e.g., OpenFoam).

Question 6

Grid and scale-box Plot-items

Grid and scale-box for plots?

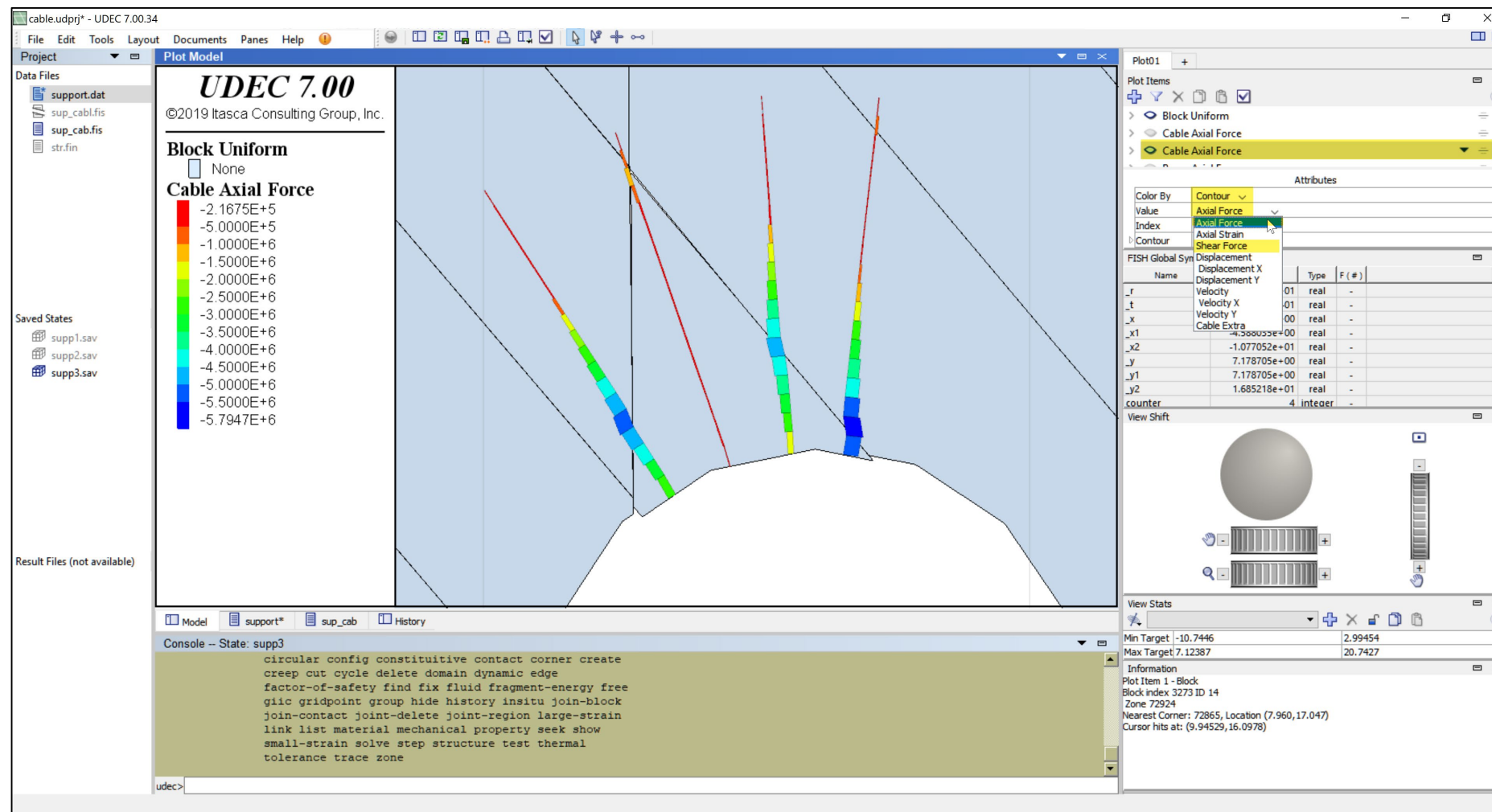
- When using *UDEC 7* (GIIC) it remains possible to plot a grid or scale axes for you model.
- There is currently no plot-item in *UDEC 7* (GUI) for this.
 - ❖ We have added this to the Common Framework development list.
 - ❖ If this is important, remember that GUI saved files may be restored in the GIIC.
 - ❖ A *FISH* function could be written to generate these plot-items using a combination of geometry and labels.

Question 7

Cable Plot Items

Can we plot the shear along with the axial forces on the bolts/nails?

- Yes
- Cable plot-item
- Contour
- Axial force
- See dropdown menu on RHS for additional options



Question 8

Plot Reset and Scale Plot Item

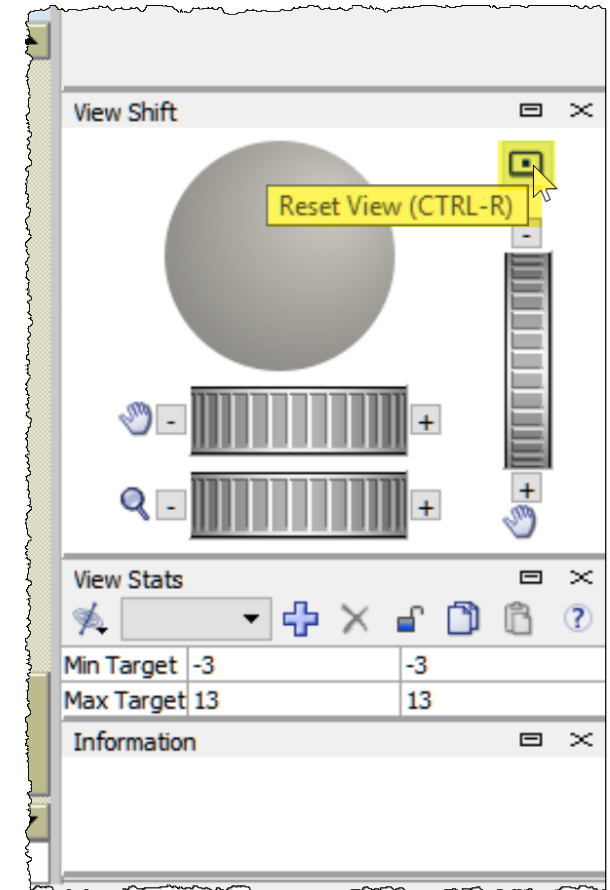
Plot reset and scale plot item?

1. How can I reset (i.e., view maximum extents) the plot view?

- You can use CTRL + R-key to reset the view in any plot
- There is also a reset button (see RHS image) in the View Shift

2. There doesn't appear to be a scale for a plot.

- When using *UDEC 7* (GIIC) it remains possible to plot a grid or scale axes for you model.
- There is currently no plot-item in *UDEC 7* (GUI) for this.
 - We have added this to the Common Framework development list.
 - If this is important, remember that GUI saved files may be restored in the GIIC.
 - A *FISH* function could be written to generate these plot-items using a combination of geometry and labels.



Question 9

FOS solve after Dynamic analysis

FOS solve and dynamic analysis

- Can we do an FOS [factor of safety] solve after Dynamic analysis where we set damping as zero?
 - ❖ *UDEC* does not change the damping as part of the solve FOS process. So, local damping would need to be turned on after a dynamic analysis.
- Do we need to reset the damping or any other parameter to be able to run FOS?
 - ❖ *UDEC* does internally turn off large-strain during solve FOS.