correlated
SOLUTIONS

Application Note

Complex Plot Extractions

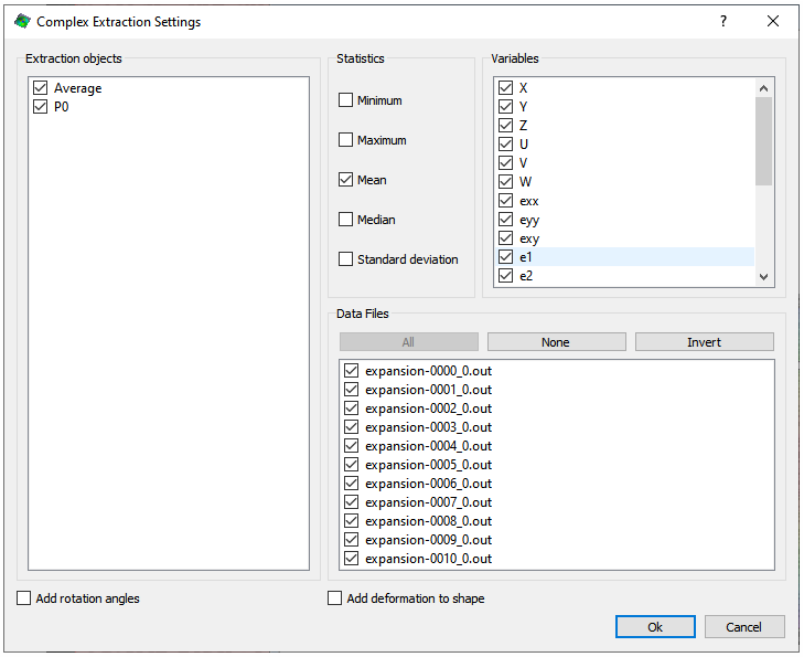
VIC-3D 9

2021

Complex Plot Extractions

Introduction

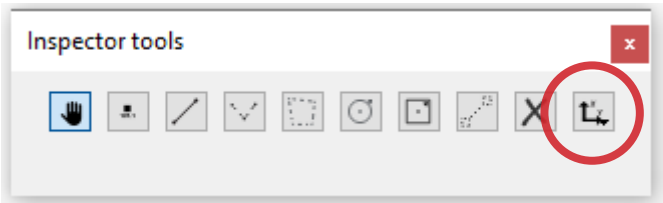
While in prior versions the simple extraction tool was limited to average values, the new complex extractions feature in VIC-3D 9 allows for the selection of statistical functions such as minimum, maximum, mean, median, and standard deviation with the statistics group. Using this feature, the user can select the desired statistic from certain extraction objects and variables for user selected data files, while also calculating rotation angles and adding deformed variables if specified by the user.



Complex Extraction Settings

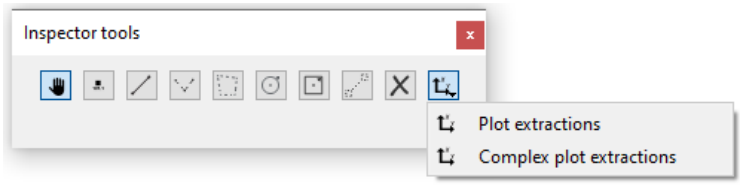
Complex Plot Extractions

To use the complex plot extraction features, the data plot will need to be viewed in 2D plot mode, found by right clicking in the 3D plot window and selecting “Show 2D plot” from the dialog menu. Once the plot is in 2D view, the inspector tools menu will appear in the project bar. A long press of the extraction button (shown in the figure below) will allow selection of the complex plot extractions via a dialog box.



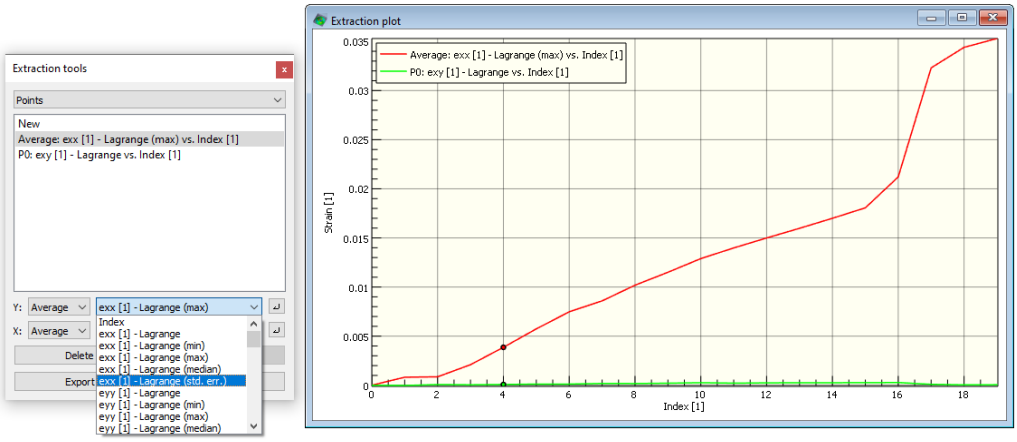
Inspector Tools Menu

From the extraction dialog menu, the user can then select a simple plot extraction or a complex plot extraction.



Plot Extractions Dialog

From the extraction dialog menu, selecting Complex plot extractions will prompt the complex extraction settings window. Within the settings window, the desired statistic, variable, extraction objects and data files can be selected for the extraction. Once all preferred options have been selected, clicking ok will open a new extraction plot window with the selected extractions plotted. Please keep in mind extracting a limited number of data files can improve extraction speed when accessing a slow or networked drive.

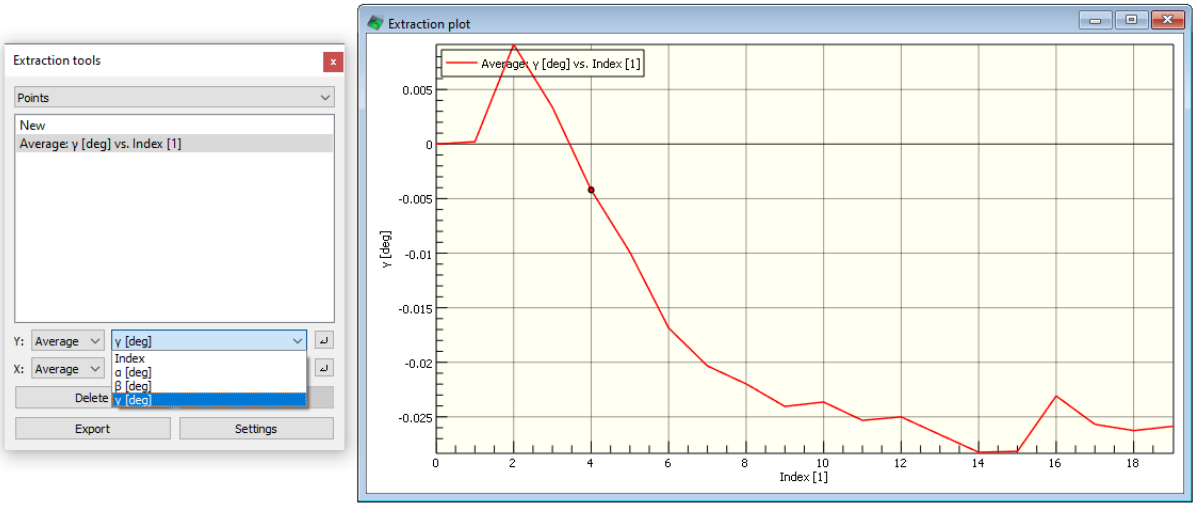


Complex Extractions Variables Plot

Rotation Angles

To calculate rotation angles, select the Add rotation angles check box from the complex extraction settings window. Once selected, this option computes rigid-body transformation (rotation) angles for the area-type inspector items, such as the rectangle extraction tool or the disc extraction tool. The transformation matrix can be computed from the pitch, yaw and roll angles (α, β, and γ respectively) as follows:

$$\mathbf{R} = \begin{bmatrix} \cos(\beta)\cos(\gamma) & \sin(\alpha)\sin(\beta)\cos(\gamma) - \cos(\alpha)\sin(\gamma) & \cos(\alpha)\sin(\beta)\cos(\gamma) + \sin(\alpha)\sin(\gamma) \\ \cos(\beta)\sin(\gamma) & \sin(\alpha)\sin(\beta)\sin(\gamma) + \cos(\alpha)\cos(\gamma) & \cos(\alpha)\sin(\beta)\sin(\gamma) - \sin(\alpha)\cos(\gamma) \\ -\sin(\beta) & \sin(\alpha)\cos(\beta) & \cos(\alpha)\cos(\beta) \end{bmatrix}$$



Rotation Angles Plot

The translation component of the rigid body transformation can be computed from the location of the area's centroid X0, Y0, Z0 and the average displacement as follows:

$$\mathbf{T} = \begin{Bmatrix} \bar{U} \\ \bar{V} \\ \bar{W} \end{Bmatrix} + \begin{Bmatrix} X_0 \\ Y_0 \\ Z_0 \end{Bmatrix} - \mathbf{R} \begin{Bmatrix} X_0 \\ Y_0 \\ Z_0 \end{Bmatrix}$$

Please note that the transformation given by R and T transforms reference coordinates into the deformed state. Checking the add deformation to shape checkbox will add variables Xd (X+U), Yd (Y+V), and Zd (Z+W) to the data set.

Support

If you have any questions about this document or any other questions, comments, or concerns about our software, please contact us at support@correlatedsolutions.com, or visit our website at support.correlatedsolutions.com.