

RELEASE NOTES

# Altair Compose<sup>®</sup> 2023

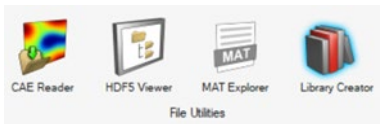
# New Features and Enhancements 2023

## Release Highlights

### Library Creator

The Library Creator is a GUI utility tool that helps to create, modify, and encrypt extensions.

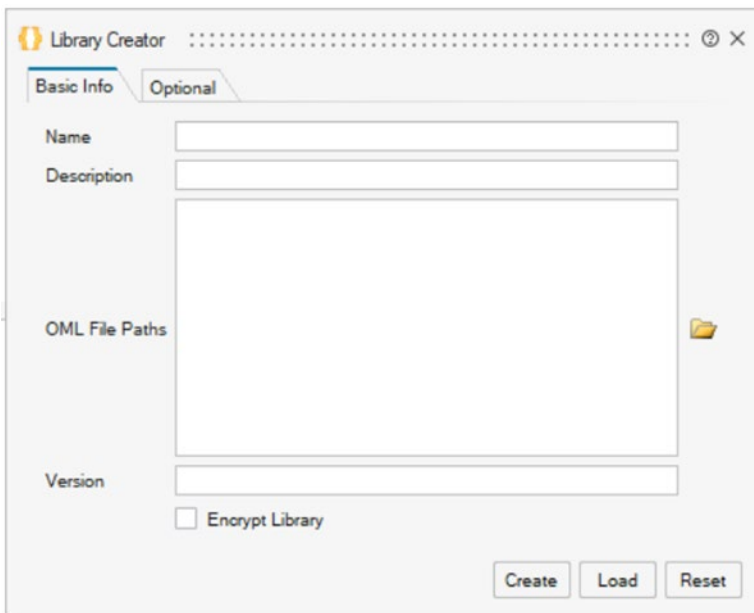
From the File Utilities ribbon, select **Library Creator**.

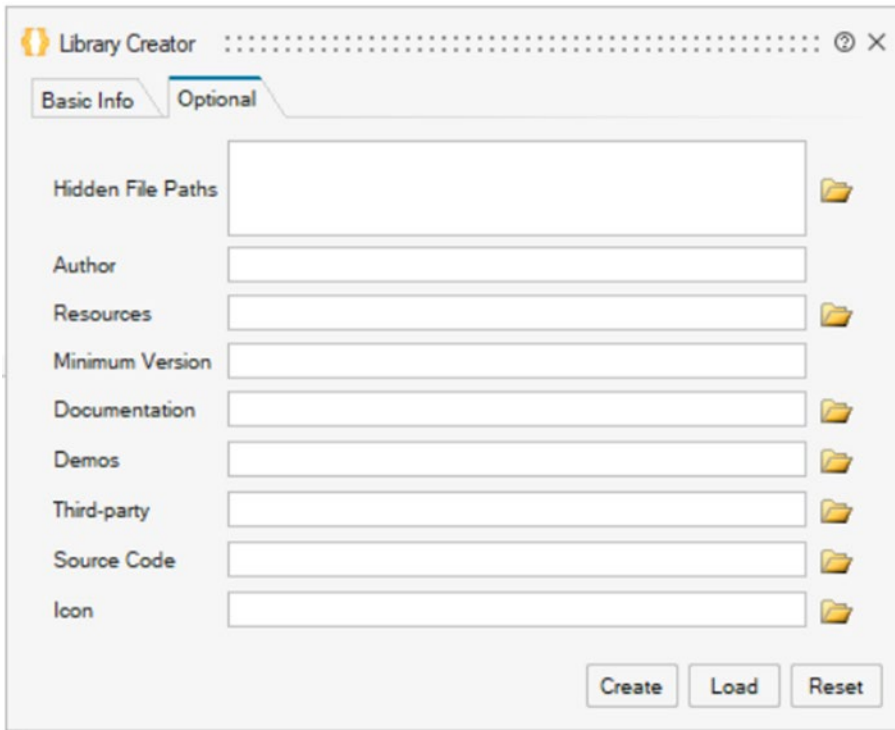


Library Creator has tabs for entering Basic Info and Optional Files for creating a Plugin.xml, loader.oml, unload.oml, and organized folders that are used as an extension.











Functions include:

- Create an extension from scratch by selecting Basic info and/or Optional.
- Create an extension from scratch by selecting Basic info and/or Optional and encrypt it.
- Load an existing extension, modify, and encrypt it.
- Load an existing extension and encrypt it.
- Encryption of python files is currently not supported.





The tool creates the necessary files and folders in the below structure.

-  demos
-  help
-  icons
-  scripts
-  src
-  third\_party
-  library.ini
-  loader.oml
-  plugin.xml
-  unload.oml

## Invoke mode

Console Invoke mode now supports Plotting and Visualization with '-withgui' argument.

```
compose_console.bat -withgui -continue -f BodeNyquistPlot.oml
```

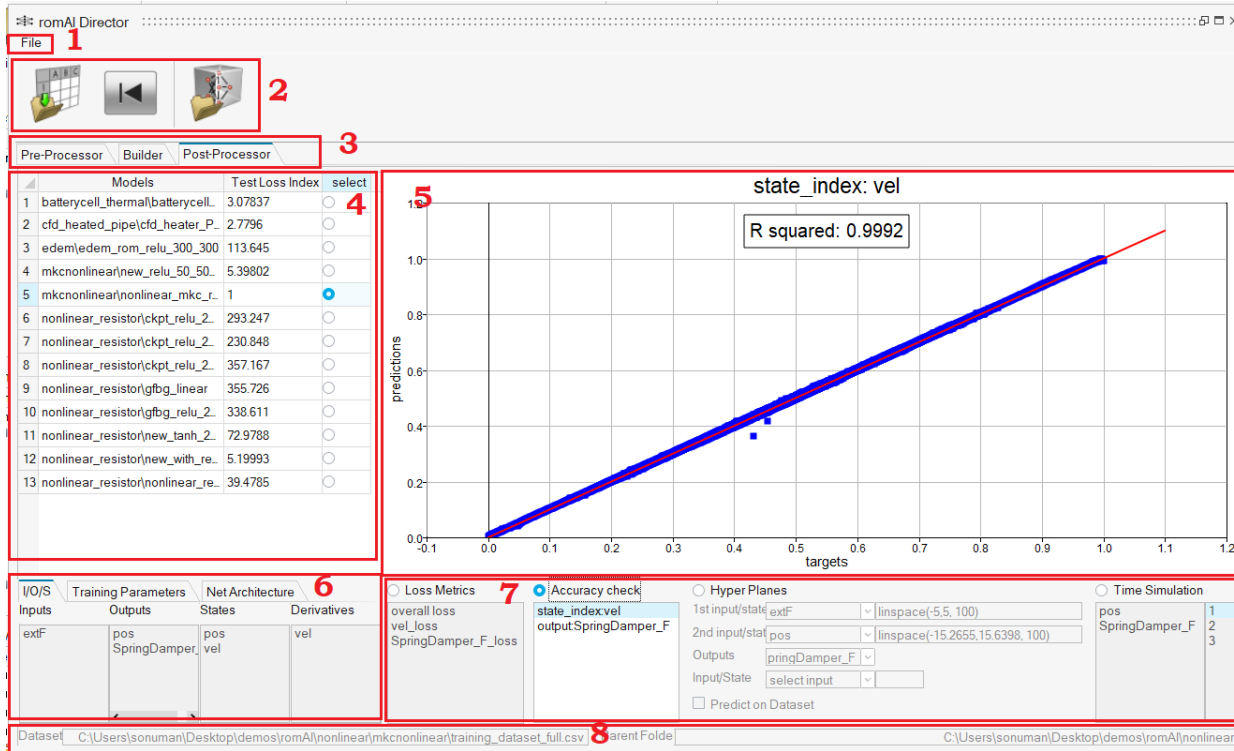
Batch mode now supports creating and saving of plots with '-withgui' argument. This requires a graphics card.

```
Compose_Batch.bat -withgui -f BodeNyquistPlot.oml
```

## Redesign and enhancements of romAI Director \*

### New UI

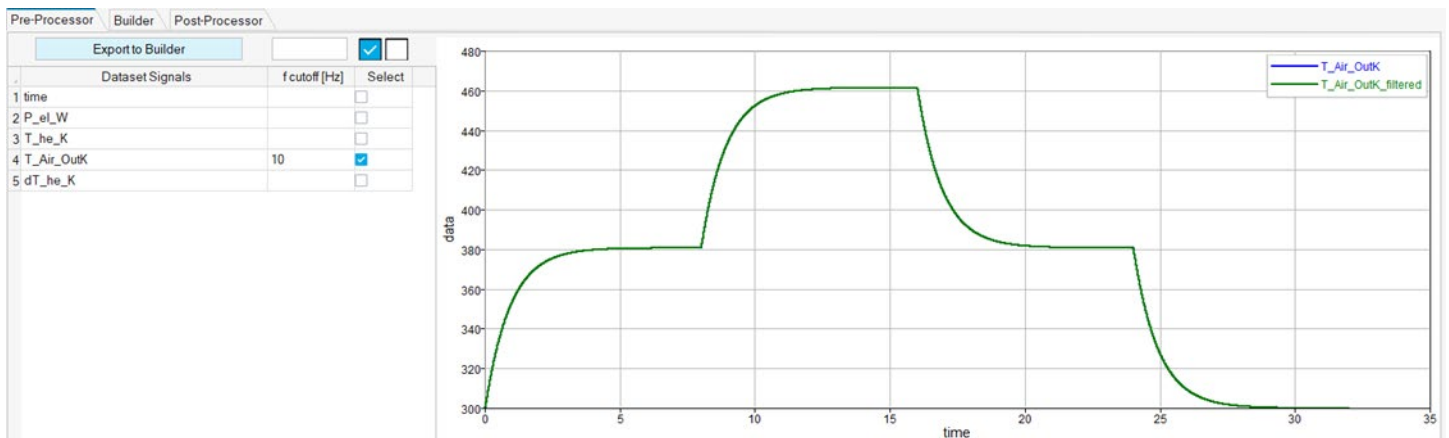
A new workflow improves ease of use.



The GUI has the following sections:

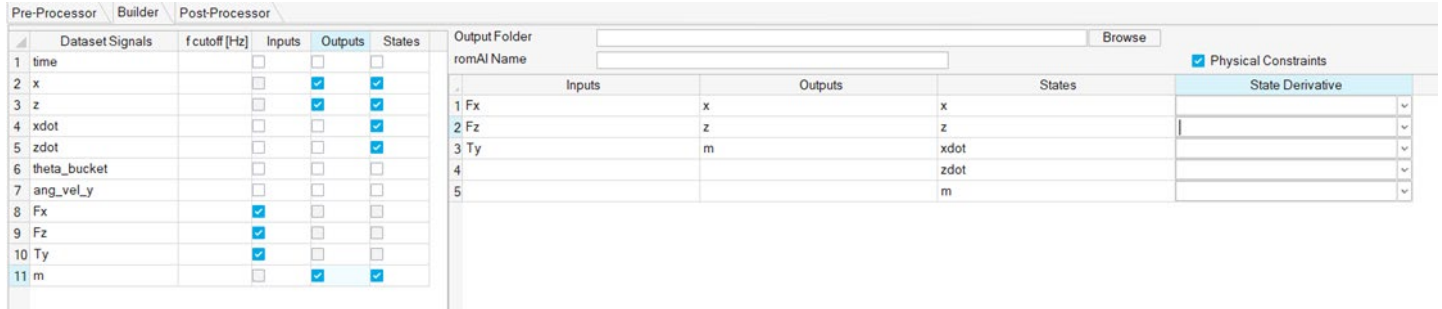
1. File Menu: Contains generic actions
2. Top ribbon: Buttons based on the uipushtool feature
3. Tabs: Provide the switching feature
4. Left table: Choose signals and models
5. Canvas: Shows plots
6. Left panels: Show dataset and model information
7. Right panels: Input parameters
8. File information text boxes

The Pre-Processor lets you plot, filter signals, and save data.



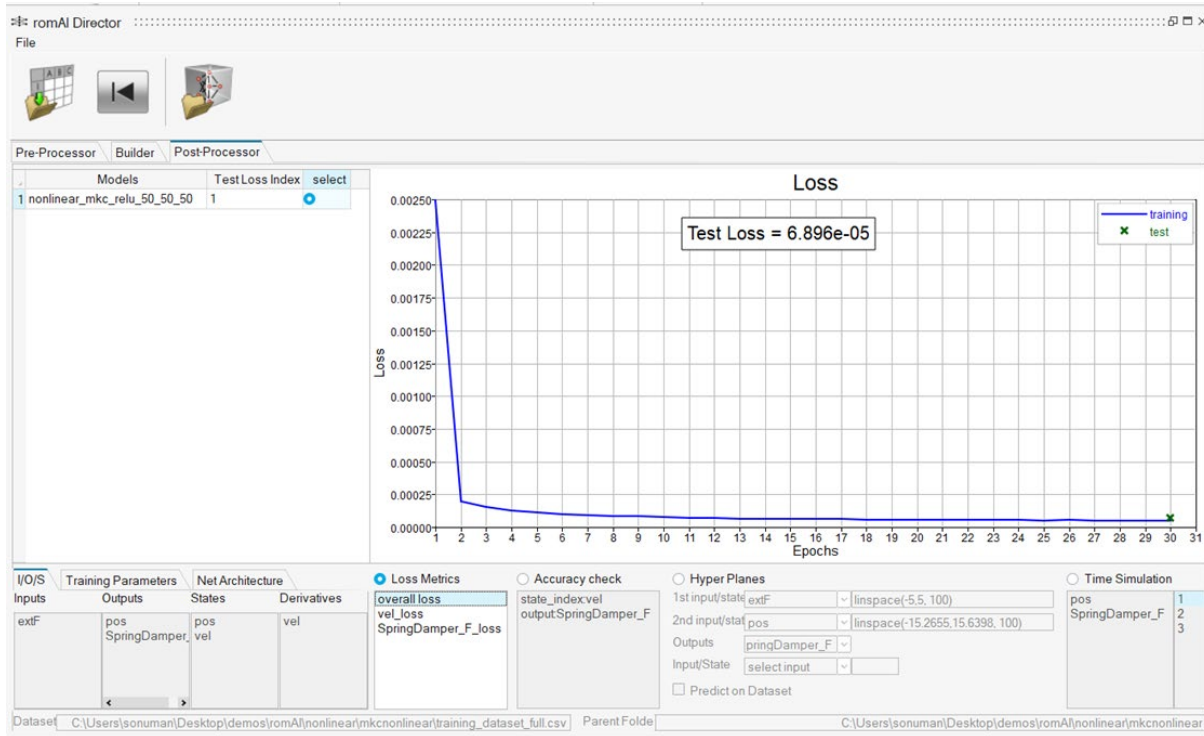
The Builder has the following functions:

- Arrange the parameters in tabs
- Add a table for all features that go in training
- Physical Constraints can be selected using a drop-down menu instead of writing



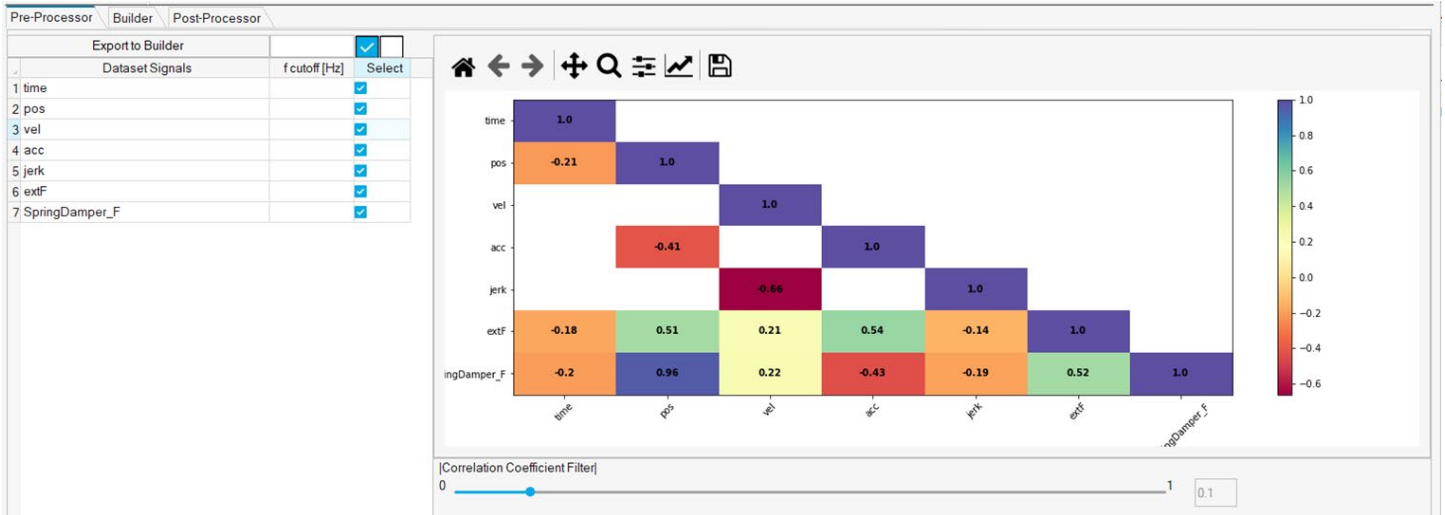
The Post-Processor has the following features:

- Visualize all results (Loss metrics, Accuracy Check, Hyper Planes, and Time Simulation) on a single page and with fewer clicks
- Process more than one model without loading models repeatedly



### Heat Map

A Heat Map has been added to show the correlation among features. This helps you select features based on correlation coefficient. The Correlation Coefficient slider helps to get most correlated features.



### Auto Exploration

Auto Exploration lets you train multiple models with different hidden layers, activation functions, and neurons.

### Stop Training

To stop model training, click the **Stop** button.



## OML

### New OML Commands

#### CAE Readers 3D \*

caereader3d now supports extraction of composite layers.

- **getlayername3d**, **getlayerindex3d**, **getlayerslist3d** commands extract composite layer information from CAE result file with model information.
- 'layer' argument in **readcae3d** can take layer information from the above commands and extract results from the composite layer.
- New **caereaderoptions** command is supported to set reader properties.

- Supported property: 'validatetime'
  - If set to 'true' it will validate that time channel values are not same. This is the default behavior.
  - If set to 'false' it will not validate the time channel information and extract the result with NaN when there is no result.

## Communicate \*

The Communicate library provides commands to support various communication protocols.

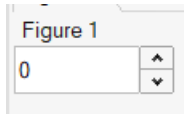
MQTT Communicate Protocol is supported in Compose. The library contains the following commands:

- **mqttclient**: Connect to MQTT broker
- **mqttpublish**: Publish a topic message to the MQTT broker
- **mqttsubscribe**: Subscribe to a topic and receive message from MQTT broker
- **mqttunsubscribe**: Unsubscribe from a topic that is already subscribed from MQTT broker
- Utility functions: **mqttclientinfo**, **mqttdestroy**, **mqttreconnect**, **mqttdisconnect**

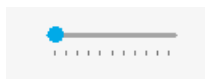
## GUI

New GUI widgets have been added.

- **uitoolbar**, **uipushtool**, **uisearchbox**, **uicontrol** style 'slidebutton.'
- **Uispinbox**



- 'tickposition', 'tickinterval', and 'tracking' properties are added to slider.



New Callback functions are supported for graphic objects.

For Figure:

- **Windowbuttondownfcn**: Function triggered when there is a mouse button press event on the figure object.
- **Windowbuttonmotionfcn**: Function triggered when the mouse is moving inside the figure area.
- **Windowbuttonupfcn**: Function triggered when there is a mouse button release event on the figure object.
- **Windowkeypressfcn**: Function triggered when there is a key press event on the figure object. The function is triggered if the figure or its children have focus.
- **Windowkeyreleasefcn**: Function triggered when there is a key release event on the figure object. The function is triggered if the figure or its children have focus.
- **Windowscrollwheelfcn**: Function triggered when there is a mouse wheel event on the figure object.
- **Keyreleasefcn**: Function triggered when there is a key release event on the figure object. The function is triggered only if the figure has focus.

- **Currentpoint:** The position of the mouse in pixels.

For axes and uicontrol:

- **buttondownfcn**

uitab:

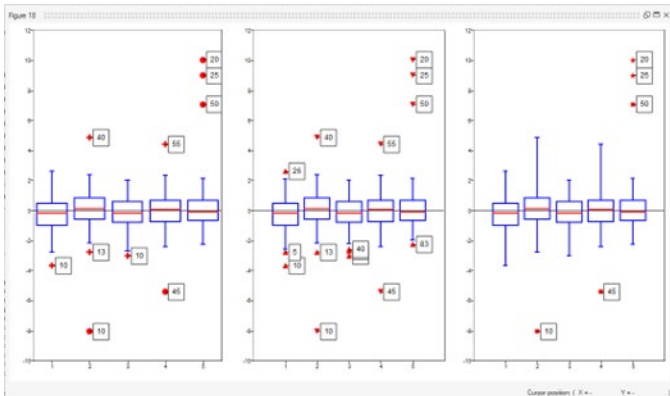
- **selectionchangedfcn:** Function triggered when tab is changed.

## Math

- Statistics functions now can ignore NaN values while evaluating:
  - **nanmean**, **nanmedian**, **nanstd**, **nansum**, **nanvar**
  - **min** and **max** functions now can ignore NaN values while evaluating.
- **Kronprod:**
  - Certain operations on a Kronecker product can be applied to A and B without computing the actual product,  $\text{kron}(A,B)$ .
  - The **kronprod** object allows this shortcut to be performed when possible.
  - Provides efficiency and ease of computation power while dealing with large matrices.
- **gradient** function is now supported to compute gradient of a function or sampled data.
- **histc** computes histogram counts.

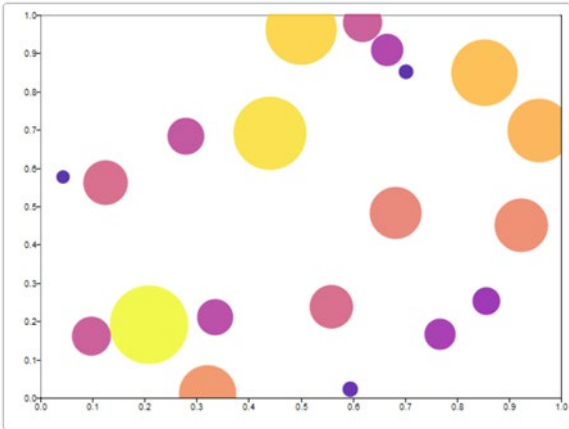
## Plotting

- **boxplot:** Creates a box plot. Returns the statistics of the input data and the handles of the graphics object.

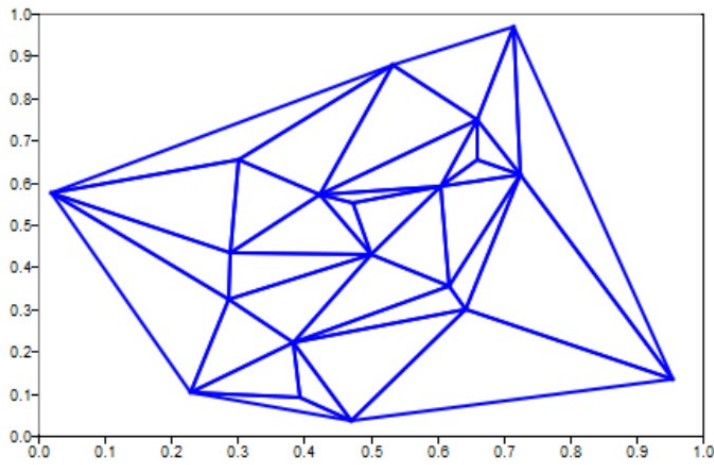


- **bubblechart:** Creates a bubble chart for data points.

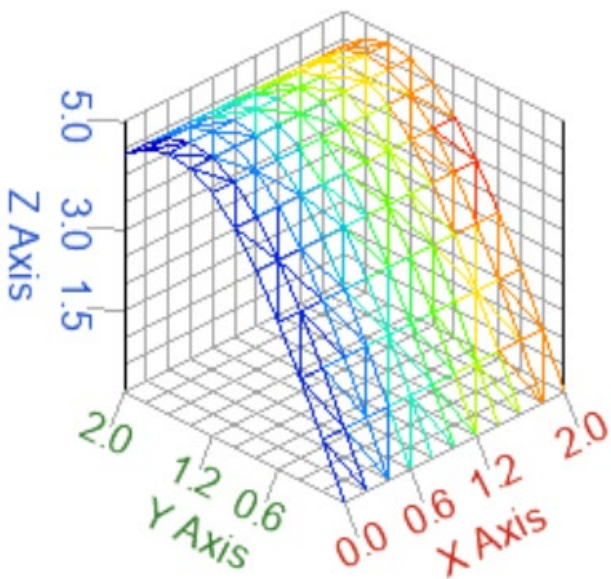




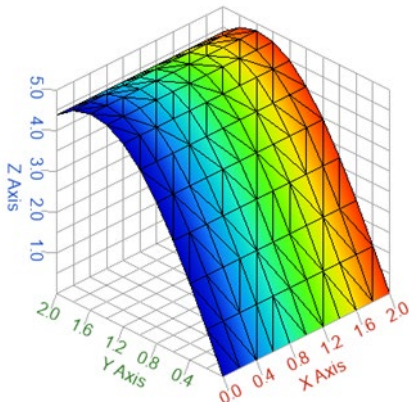
- **triplot:** Creates a 2D triangular mesh.



- **trimesh:** Creates a 3D triangular mesh with triangle indices of x,y,z matrices.



- **trisurf**: Creates a 3D triangular surface with triangle indices of x,y,z matrices.



### Python OML bridge

- table class now can be mapped to pandas DataFrame.
- Python Object Class mapping to OML object class

### Signal Processing

- **filter2**: Performs 2D FIR filtering.
- **findpeaks**: Now accepts sampling frequency and time as input arguments to locate the peaks.
- **pwelch**: Now supports 'spectrum type' as an argument to calculate Power spectral density.
  - Valid options are 'PSD' or 'power.'

### Table

New table functions are now supported:

- **table2array**: Converts non-numeric data table to array.
- **table2cell**, **table2struct**, **struct2table**, **cell2table**
- 'variablenames' property is now supported.

## Additional Changes and Enhancements for OML Commands

### Table

The **table** function now sets "ColX" as the default variable name if the 'variablenames' property is not set.

## Enhancements

### Enhancements for MAT Explorer

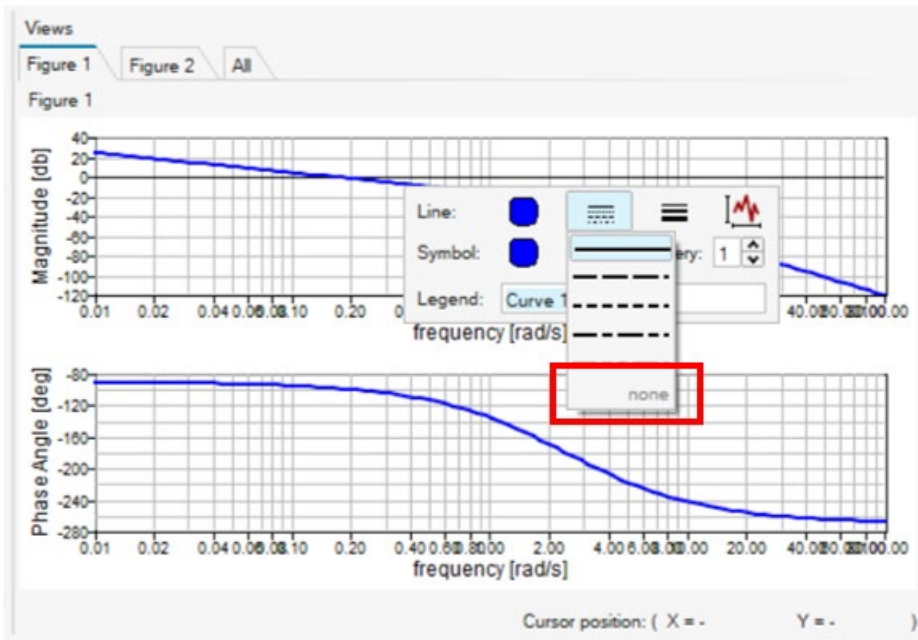
MAT Explorer icon has been updated.

### Enhancements for Plot Assistant

- Collapsible categories of 2D and 3D plots have been added.
- New plot types bubblechart, box plot, triplot, and pareto have been added in 2D plots.
- Trimesh and trisurf have been added in 3D plots.

## Enhancements for Plotting

Added an option to disable the line in microdialog of Plotting.



## Enhancements for UI Designer

New properties have been added to the following widgets:

- Slider: tracking, tickinterval, tickmarks

slider: Slider	
Property	Value
- uiObject	
<b>objectName</b>	slider
- uiWidget	
visible	<input checked="" type="checkbox"/>
toolTip	
enabled	<input checked="" type="checkbox"/>
<b>geometry</b>	[(70, 60), 84 x 20]
- uiAbstractSlider	
minimum	0
maximum	99
pageStep	10
value	0
tracking	<input checked="" type="checkbox"/>
<b>orientation</b>	Horizontal
- uiSlider	
tickInterval	0
callback	
callbackdelay	0.000000
createfcn	
deletefcn	
interruptible	<input type="checkbox"/>
keypressfcn	
tag	
tickmarks	nomarks
units	above
userdata	below
	both
	nomarks

- Uitab: visible, selectionchangedfcn,
- Uipanel: enable property

## Enhancements for User Interface

- Split view improvements have been made.
- Dark theme color scheme has been added.

## Resolved Issues

### Control System

- margin function error: index must be positive
- transfer function terms based on tf('s') not echoed to command window if the value is too small
- bode generates an error when system matrix is singular

### GUI/UI Designer

- [Regress] UiPanel border property 'etchedin' shows different result

- [Regression] Running the attached test shows a warning twice
- Populmenu does not show dropdown item when more than 1 matching items are found using regex
- String gets truncated in slide button
- Autocomplete prints a first letter of command on pressing enter
- Horizontal alignment property not saved for textbox from uiDesigner

## Math

- ode45 gives error as "user function failed"
- \* ode45 does not recognize single output form sol=ode45(...) which has the structure with sol.x and sol.y set
- de2bi(8,'s') should raise an error
- issymmetric(NaN) and ishermitian(NaN) return to different result

## OML

- PsimWriteGraphFile does not output anything
- ismember cannot handle empty matrices
- writetable gives wrong result in the xlsx file
- checkbox not working in UI control
- Compose scripts using global variables behave differently before and after encryption
- OML Function parsing: incorrect function is parsed and executed with no error
- textread regression to read ascii files
- imread / imwrite defined in two source locations
- varargin and varargout issues
- inputname function does not update correctly inside an OML class
- unix() behaves different for win and linux
- OML Command window: Table value printed partially
- textread parses on blank spaces when the delimiter is given
- hide table class methods from variable browser
- compose crashes when using hdf5 readers in parfor
- parfor for assigning nd matrix
- addpath should reorder the path and put the path at top (or end) even if the path exists
- function lookup should look for different extensions in each path before moving to the next path
- License Expiration Message is incorrect and fixed.

## Plotting

- Wrong type of label for a figure with "mesh" and "plot3" commands
- The Figure sequence reverses when plots are done hide all and then show all

## Other Libraries

- Python: default a variable with name "n" is created and visible in Python Variable Browser

**\* Applies to Standard Edition only as a paid extension**