

RELEASE NOTES

Altair Activate[®] 2022.3

New Features and Enhancements 2022.3

Release Highlights

Interfaces ^{*}

You can now import and export FMUs for Model Exchange and Co-Simulation, which supports the FMI-3.0 specification. All features supported for FMI-2.0 import/export in older Activate releases are supported in FMI-3.0 import/export. Continuous-time and clocked based models can be exported as 3.0 FMUs for Model Exchange, Co-Simulation, and the source code.

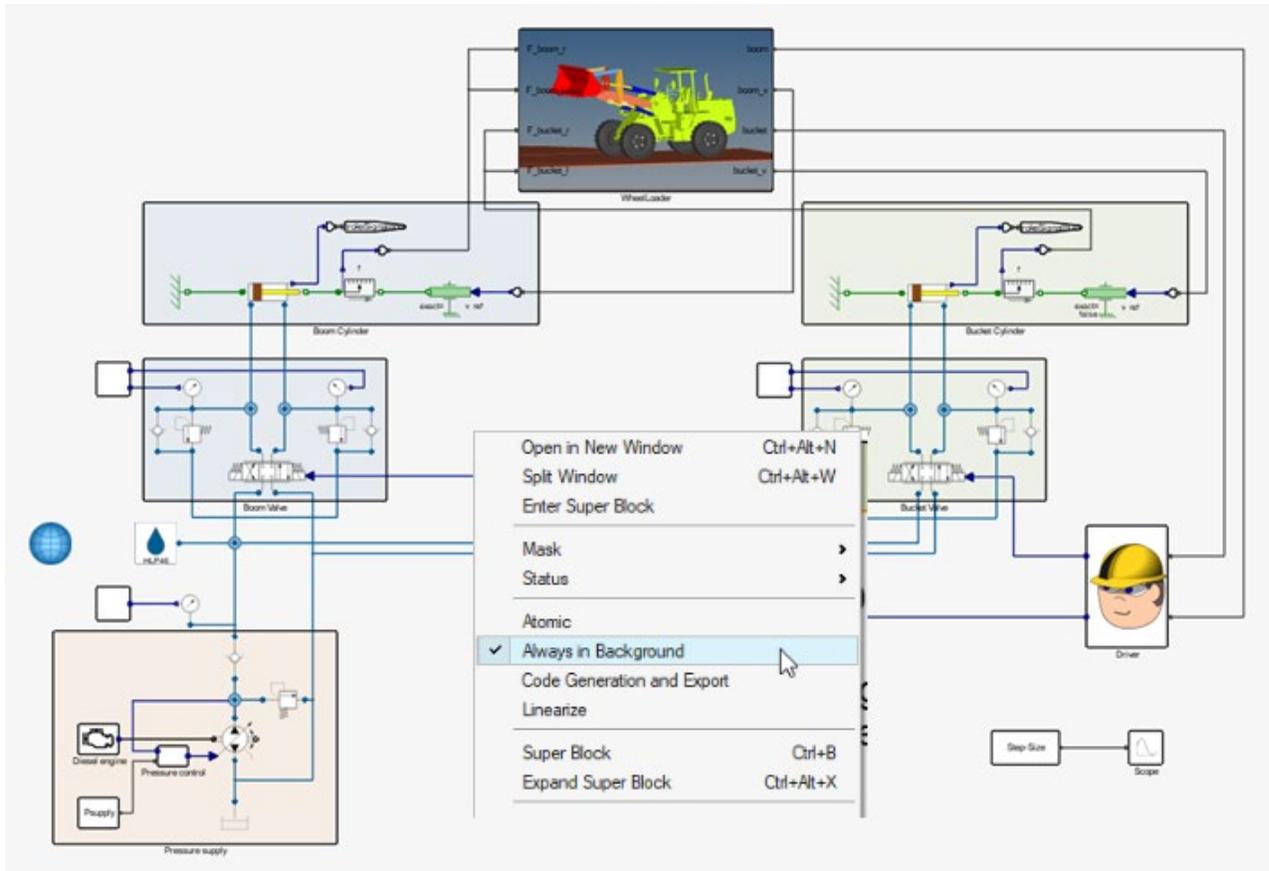
The following 3.0 specific features are supported:

- [Clock](#) - Handles clocked and discrete-time models for Model Exchange and Co-Simulation.
- [Variables](#) - Handles 1D and 2D input/output variables and variables with new integer datatypes.
- [Source code and build description](#) - Enables automatic compilation of exported FMUs for real-time and different operating systems.

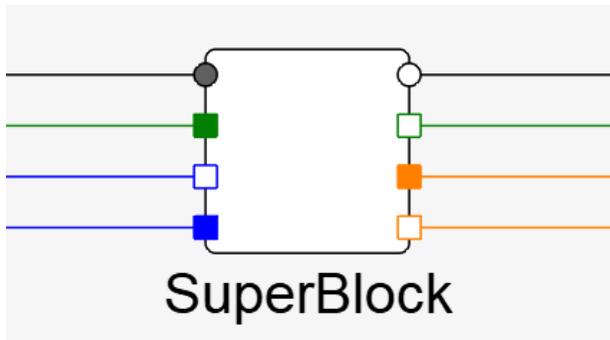
You can export a romAI as an inlined FMU using FMI-2.0 and FMI-3.0 export. This can be useful in Embed, for example.

User Interface

- You can use an empty super block with the **Always in Background** property to add background color or an annotation image. Graphical elements in the background of a model help visualize context and structure a diagram.



- Super block connector graphics now represent the connector data.



FMU checker

The source code and necessary libraries as well as the executable are now available for the FMU checker.

- Source code: Activate2022.3\hwx\modules\sim\io\fm1\fm12_cs_simulator
- Binary: Activate2022.3\hwx\bin\win64\fm12_cs_simulator.exe
- Help: ../doc next to the source code or the executable.

To regenerate the executable, run runme.bat or runme.sh in Windows or Linux.

```

C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22621.1265]
(C) Microsoft Corporation. All rights reserved.

D:\Program Files\Altair\2022.3.7729\Activate2022.3.7729\hwx\bin\win64>fm12_cs_simulator.exe
Press any key!

Usage: fm12_cs_simulator command line arguments:

-f <FMU file name>
--fmu <FMU file name>      The fmu file-name to be co-simulated.

-s <stepSize>
--step <stepSize>         StepSize is the communication step size for advancing the co-simulation time.

-t0 <Start time>
--start <Start time>      Simulation start time. If not specified, the information from 'DefaultExperiment' in the model description XML will be used.

-tf <Final time>
--final <Final time>     Simulation final time. If not specified, the information from 'DefaultExperiment' in the model description XML will be used.

-i <input csv file>
--input <input csv file> Name of the CSV file name with input data, if 'stdin' is specified, keyboard will be used.
                          if changing tunable variables or parameters is need during the simulation time, this is the only way.'.

-o <output csv file>
--output <output csv file> Simulation result output CSV file name. Default is to use standard output (stdout).

-a
--all                      Print all variables to the output CSV file.Default is to only print outputs.

-u <unzip-dir>
--unzip <unzip-dir>       Temporary directory used for unzipping the FMU. if not specified, a system temporary directory will be used.

-p <name> <value>
--parameter <name> <value> The start value of the <parameter-name> is set to <parameter-value>. This value can be overridden by the option -i stdin.

-e <log filename>
--logfile <log filename>  Defines the log file name. Default is to use standard error (stderr).

-l <log level>
--level <log level>      Log level takes: (0: no logging), (1: fatal errors only), (2: errors), (3: warnings) , (4: info), (5: verbose).

-g
--off                      Log only FMU messages.

-h
--help                    Prints these help messages.

fm12_cs_simulator -f model.fmu -i input.csv
fm12_cs_simulator -f model.fmu -i stdin
fm12_cs_simulator -f sinew.fmu -p amplitude 2.36 phase 0.56
-----
D:\Program Files\Altair\2022.3.7729\Activate2022.3.7729\hwx\bin\win64>

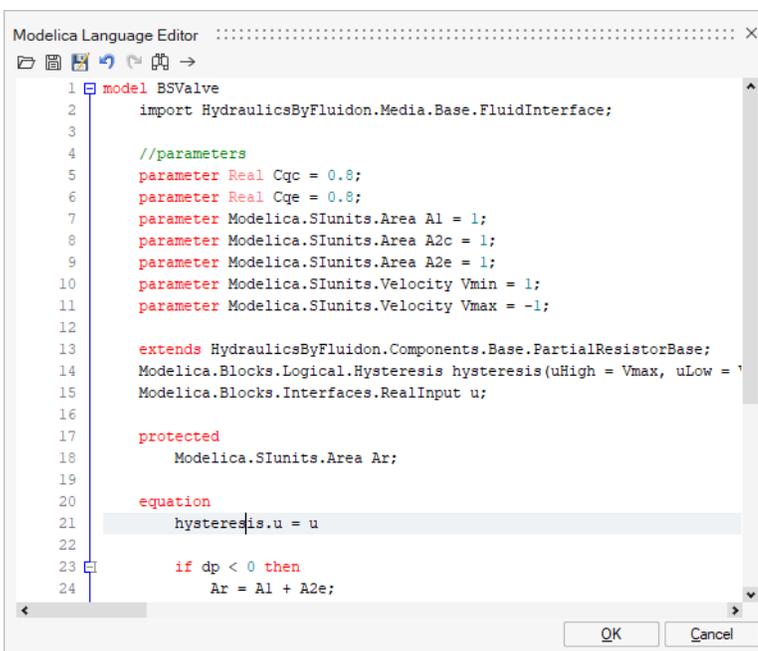
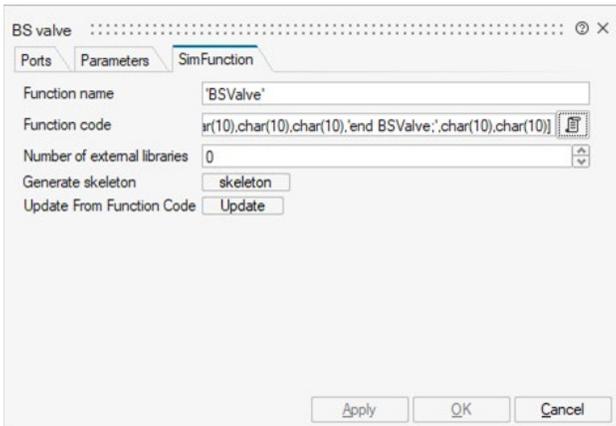
```

Libraries

Additional Changes and Enhancements for Libraries

Syntax check

Syntax check functionality has been added for Modelica code in MoCustomComponent and MoCustomBlock.



Syntax check functionality has been added for Python code in PythonCustomBlock.

ModelicaExtras

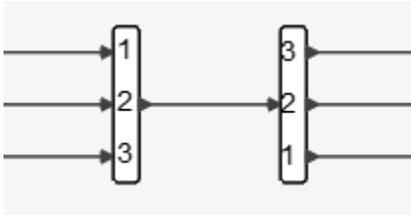
The rotational VariableSpring and VariableDamper components have been added.

Help

Library names are shown in block documentation.

Routing

Mux/Demux blocks have numbered port labels. This is helpful if a mux/demux block is rotated and flipped.



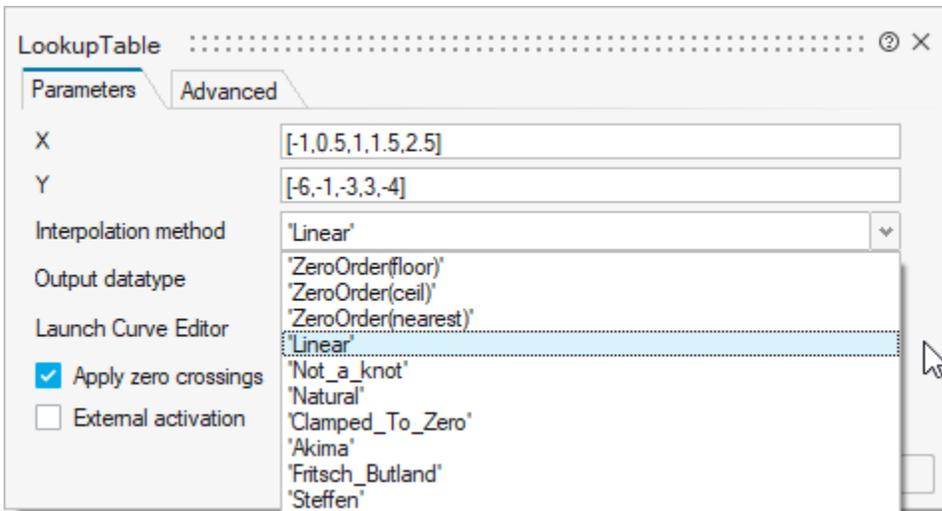
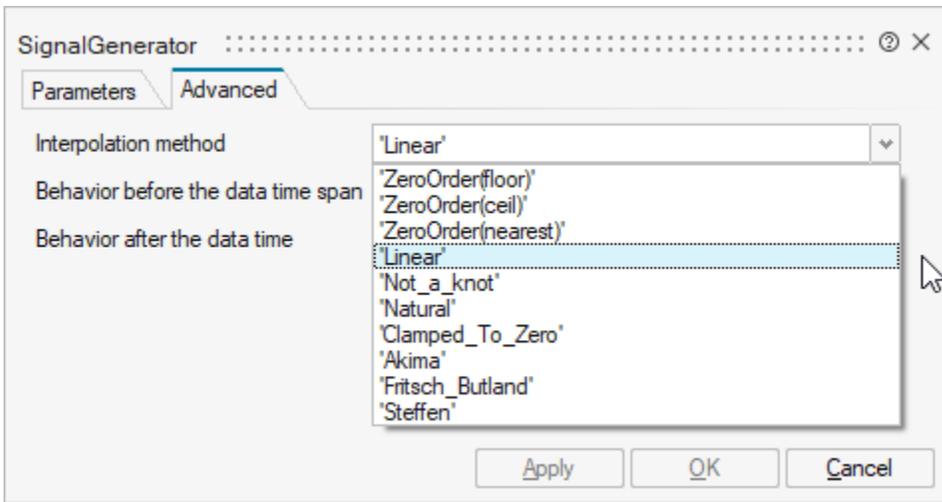
State Machine

The State Machine library is now always visible in the palette browser.

Arduino

The Arduino library is now available in the Extension Manager.

SignalGenerator and LookupTable



Enhancements

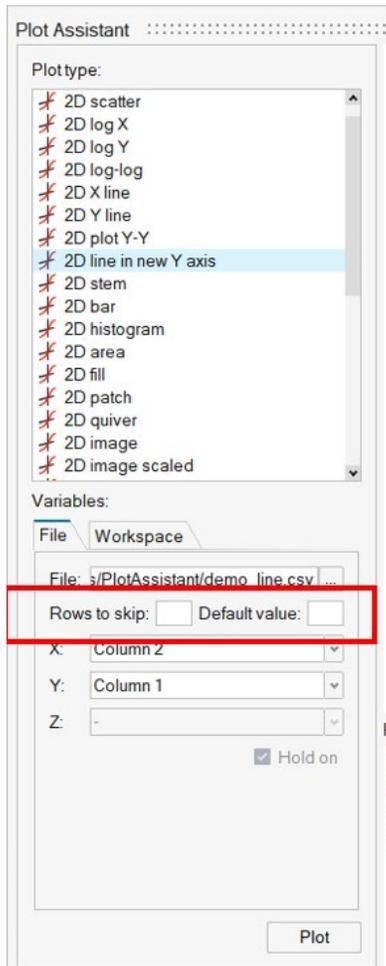
Enhancements for Code Generation and Export^{*}

- The number of supported blocks for inlined code generation has been expanded.
- MISRA compliance has been expanded.
- Inlined code standalone generation has been extended to support more than one activation input.

Enhancements for Plot Assistant

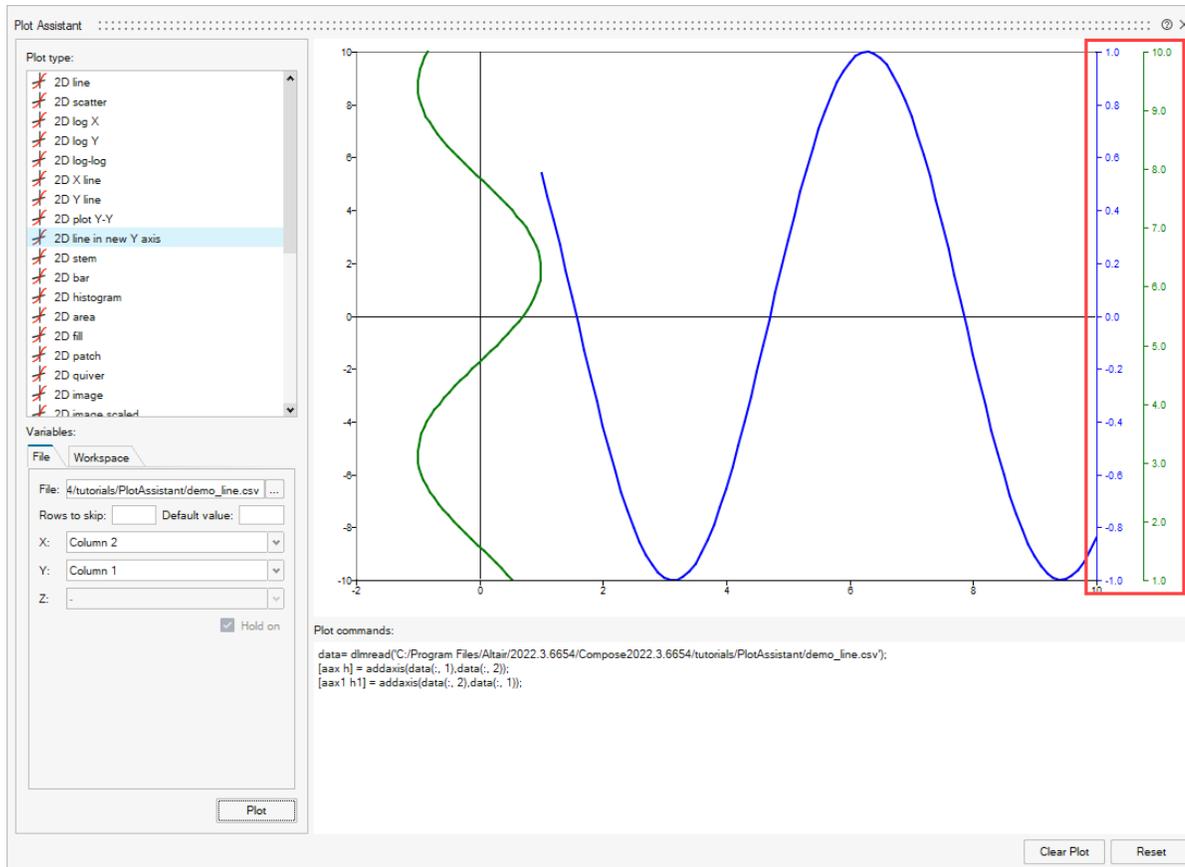
File import options include:

- Rows to skip: The number of rows from the beginning of the file that dlmread does not read.
 - This is useful when a file contains multiple lines of headers before the numeric data.
 - The Plot Assistant tries to determine the number of rows to skip automatically when a file is selected.
- Default value: The value to be used in the output for empty or non-numeric values of the input file. If left empty, the value is set to 0.
- If the file has changes since the last time it was loaded, you are prompted to select whether to reload the file or use the data already loaded in the Plot Assistant



Every time the file is loaded in the Plot Assistant, an information label is shown in the lower left corner of the window.

A new **2D line in new Y-axis** plot type has been added. It plots the given dataset on a new vertical axis on the right side of an existing 2D plot.



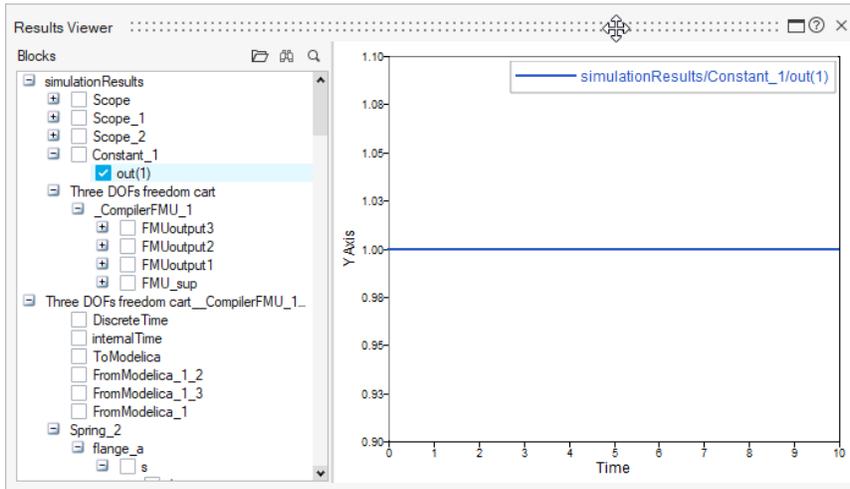
Enhancements for UI Designer

- When **addaxes** is selected, backgroundcolor and properties are disabled.
- The **fontunits** property is supported for text.

Enhancements for User Interface

Results Viewer

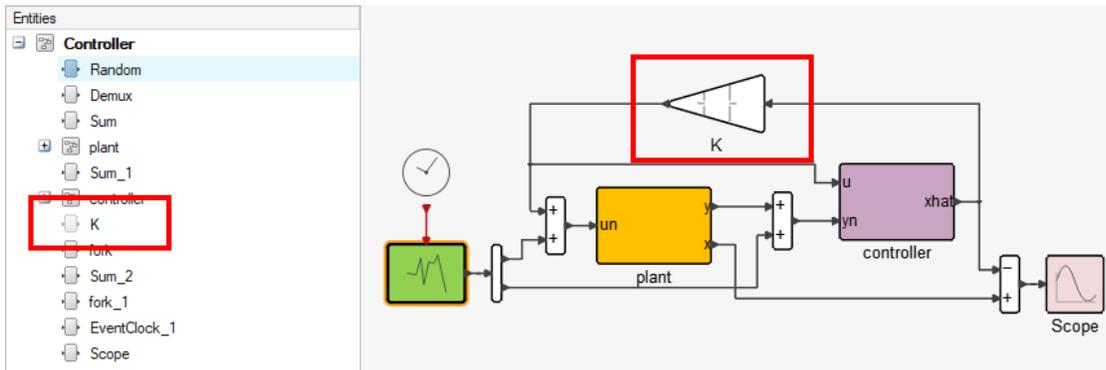
- Results Viewer variables are ordered by components and for Modelica. This gives easier and quicker access to the variables, especially when you might not know the complete textual variable name.



- Results Viewer now displays also constant signal instead of a single point.

Project Browser

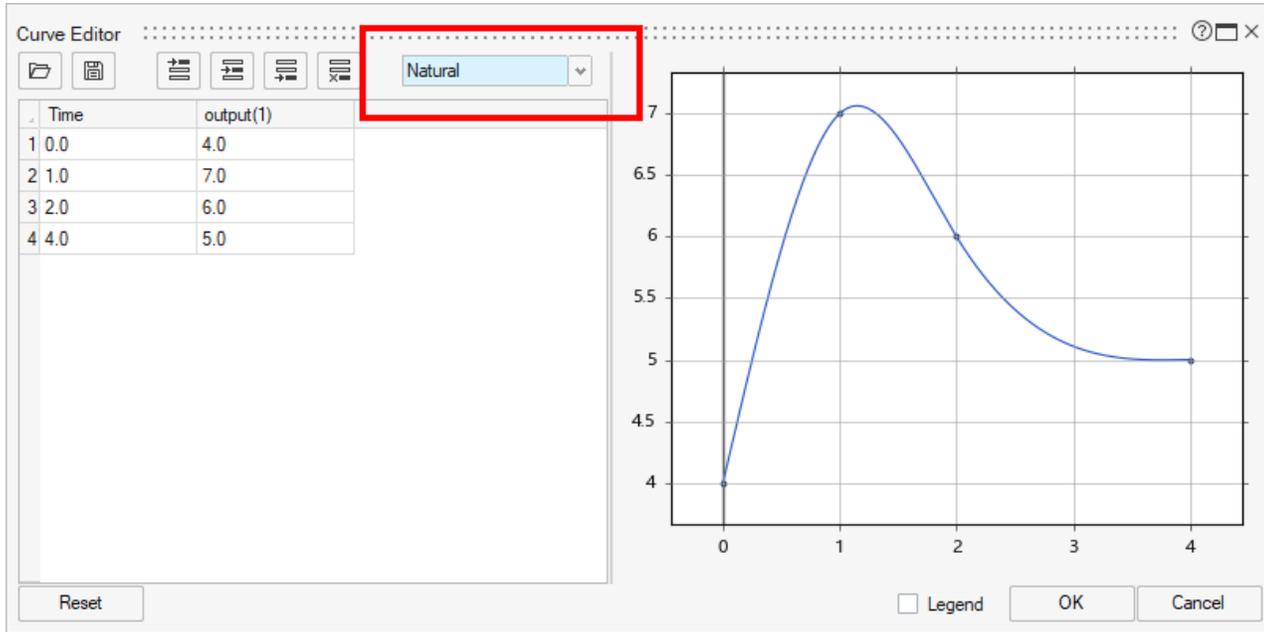
- The representation of block status in the Project Browser has been updated. Deactivated blocks with a status of Off have a gray icon.



- When you click and copy a plot, the figure is copied and can be pasted elsewhere. When a block is copied, it can be pasted in the BDE.

Curve Editor

You can now select an interpolation method in the curve editor for SignalGenerator and LookupTable.



Message Center

Hyperlinks are now shown in the Message Center.

The screenshot shows a simulation model with a block labeled 'ContStateSpace_1' containing the equations $\dot{x} = Ax + Bu$ and $y = Cx + Du$. Below the model is the Message Center window, which displays the following error message:

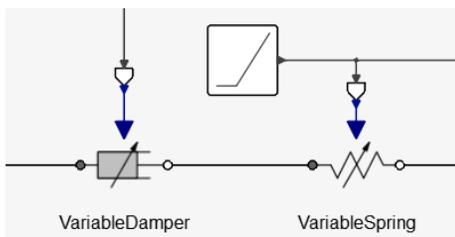
```

16:43:07 [Controller]: Error: In the definition of block parameters: Error: 'L' is not defined ( 100 )
Block(s): controller/ContStateSpace\_1
Model: Controller
    
```

The error message is highlighted in blue, and a mouse cursor is pointing at the hyperlink [controller/ContStateSpace_1](#).

ModelicaExtras

The rotational VariableSpring and VariableDamper components have been added.



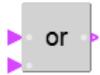
Help

Library names are shown in block documentation.

[Home](#) › [Reference Guides](#) › [Block Reference Guide](#)

Or

Logical 'or': $y = u1 \text{ or } u2$



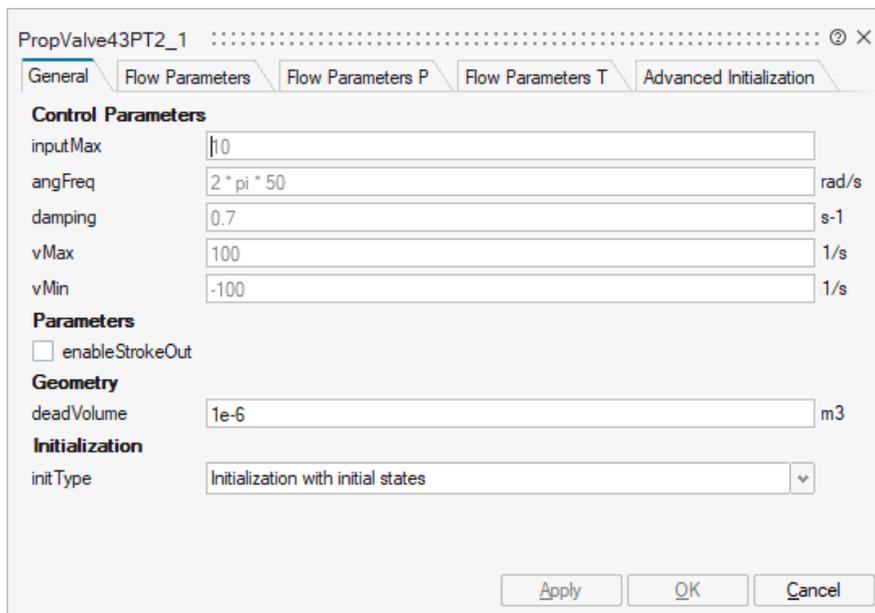
Library

Modelica/Blocks/Logical

Description

Block Parameter GUI

Group text is now bold for better visibility.



Block icons

Different text icon size are now supported, for example, in Modelica components.



Scope

When final time is set to *inf* in the Simulation Parameters dialog box and the simulation is stopped by an End block at some point, the automatic X range in the scope sets the actual stopped time as the max time.

List box

In a list box, you can now select multiple options with the Shift key.

OML

New OML Commands

CAE Readers 3D

- **getsubcaselist3d, getsubcaseindex3d, getsubcasename3d**: Returns all subcases, the index of a given subcase, and the name of the subcase from the input CAE result file.
- **getelemindex3d, getelemname3d**: Returns the index of a given element and the name of the element from the input CAE result file.
- **getnodeindex3d, getnodename3d**: Returns the index of a given node and the name of the node from the input CAE result file.
- **getnumcomps3d, getnumelems3d, getnumnodes3d, getnumtypes3d**: Returns the total number of components, elements, nodes, and types available in the input CAE result file.
- **gettimesteplist3d**: Returns the timestep list from the input result file.

Linear Algebra

- **null**
- **orth**: Computes an orthonormal basis for the column space of a matrix.
- **ldl**: Performs LDL decomposition on a given matrix and outputs upper, lower triangular, diagonal and permutation matrix.
- **norm**: Computes matrix and vector norms with specified parameters and with infinity or Frobenius norm.

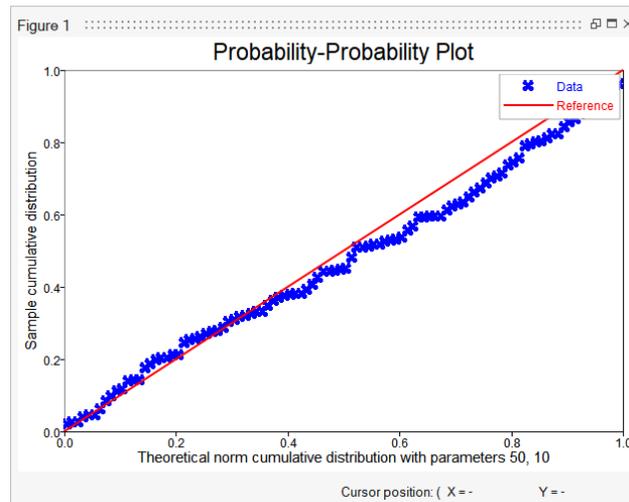
Plotting

- **addaxis**: Plots the given dataset on a new vertical axis on the right side of an existing 2D plot.

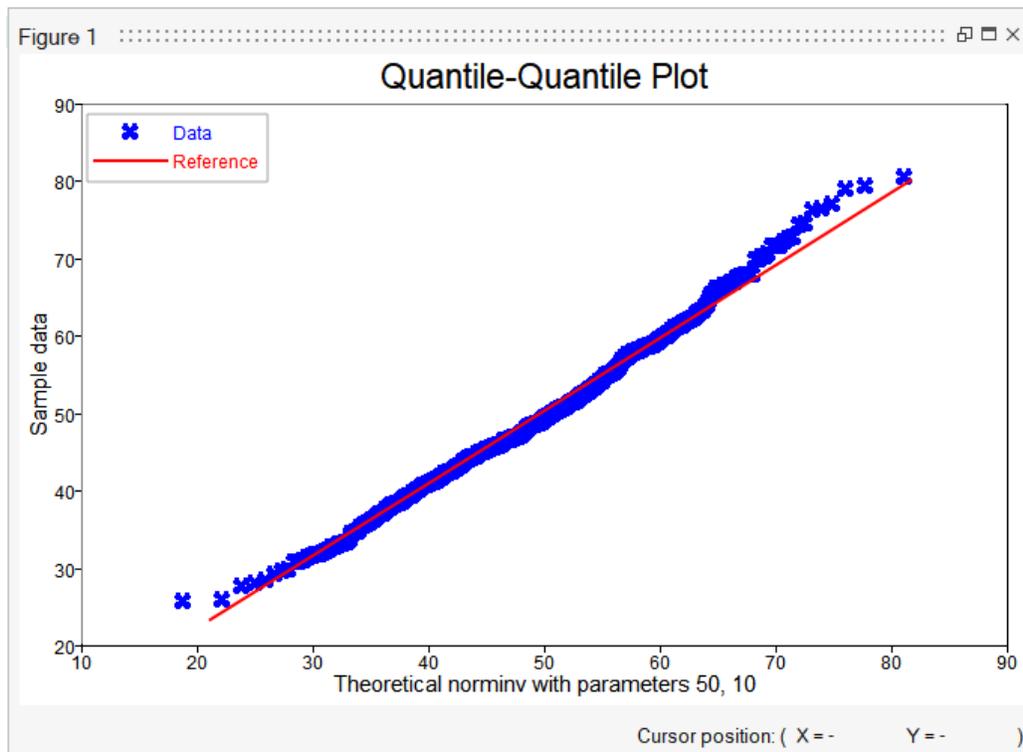
Statistical Analysis

- **ppplot**: Creates a probability-probability plot.

```
1 rand('seed', 2023);
2 n = 100;
3 data = chi2rnd(50,n,1);
4 ppplot(data, 'norm', 50, 10);
```



- **qqplot**: Creates a quantile-quantile plot to determine if two datasets come from populations with a common distribution.



Table

- **table2array**: Converts a given table to an array.

Additional Changes and Enhancements for OML Commands

CAE Readers 3D

New arguments are now supported in the **readcae3d** command:

- Corner data now supports the keyword "only" to match the HyperView result.

- Advanced average method is now supported.
- Averaging now supports struct input to specify HyperView averaging methods.

String Operations

- **sscanf** now supports format to skip. Valid options are '%*d', '%*f', '%*g' and '%*s'.

Online Help

- A tutorial has been added for Embed block export. *
- A new Debugger topic has been added to the online help.

Resolved Issues

UI

- Creating a super block from a Hyperspace block placed all ports on the left. *
- Redoing super block creation caused port blocks to be unconnected in some cases.
- Block port text icons were not aligned correctly with different lengths.
- The New Window action worked on a regular super block but not a masked super block.
- When you pressed Ctl-Alt-X on a super block followed by Ctl-B, there was an error.
- If you expand a super block when its content is displayed in split view, the split view should update with the upper level diagram.
- If you expand a super block, direct input/output links are removed inside the super block.
- The link was missing and contained a split after copying a block.
- On a touch pad, the zooming direction did not match the finger direction.
- The Square Wave Generator appeared differently between the Signal Viewer and the Scope Window.
- In UI designer, there was an issue with the default border style of a uipanel.
- In the UI designer, there was an issue with savefig and openfig.

OML

- Plotting
 - semilogx did not support multiple series.
 - When you hold Ctrl and click the mouse button in the plot, text was not added properly.
 - Plots with multiple vertical axes were not loaded correctly.
 - Slider min/max property changes did not update the widget.
 - There was an issue with the default border style of a uipanel.

Modelica

- Modelica BodyBox width vector or width/length boxes were swapped.
- In Modelica animation, the width direction parameter of the box shape was not considered.

romAI *

- Physical Constraint tables did not show more than eight states in romAI Director.

- The romAI Director Time Sim tab skipped the first and last data point while plotting.
- An accuracy check in romAI Director showed an NAN value when the test dataset started from a non-zero time value.
- The accuracy check plot was incorrect in the case of dynamic roms.
- A model without input had an error.
- The Hyperplanes GUI in romAI did not support plotting without a dataset.
- romAI block did not take more than 32 inputs.

Library

- Mask parameter expressions were not working properly, with the wrong answer and inconsistent behavior.
- Help was missing for some StateMachine blocks.
- Help was missing for some Dynamical blocks (ContDescriptorStateSpace, ContStateSpace_SS, ContStateSpace_Y, ContTransFunc_SS, ContTransFunc_Y, ContTransFunc_X).
- Documentation was wrong for FromModelica.

Miscellaneous

- vcruntime140_1.dll was missing when Activate was opened in a clean Windows machine.

Linux

- Activate help failed to launch on Linux.

*** Applies to Business Edition only**