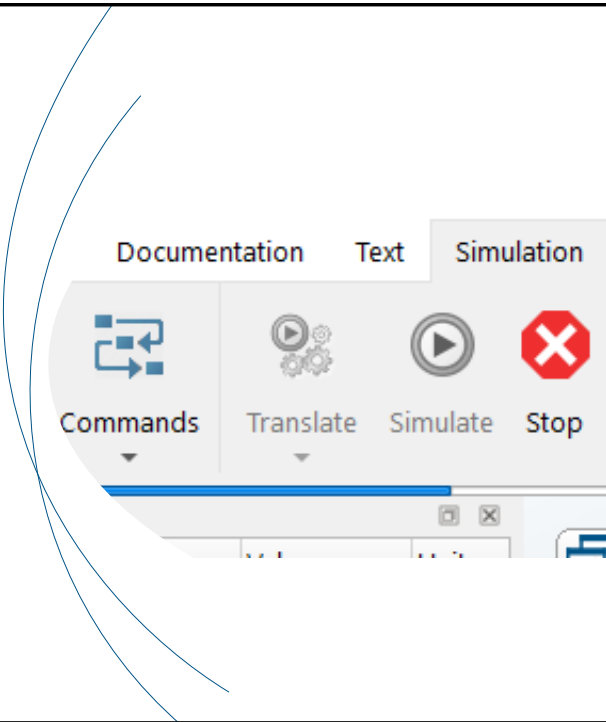




# DYMOLA 2025X REFRESH 1 HIGHLIGHTS

18 April 2025



## EXECUTIVE SUMMARY

### Model development

- Further improved unit checking
- No code generation that does not affect outputs (optional)
- More accurate parallelization for external functions

### Simulation

- Simplified parameter optimization user interface
- Enhanced Monte-Carlo simulation
- Improved generation of analytic Jacobian

### Environment

- Download and install libraries from GitHub
- Meta data to support creating the Commands menu in Dymola

## MODEL DEVELOPMENT

3

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## UNIT CHECKING

- Unit checking as proposed by MAP-LANG has been further improved
  - Unit checking can infer units by combining constraints from multiple equations
- Inference for `absoluteValue`
  - Relative temperatures will now automatically use unit-conversion without offset
  - If it is equal to another relative temperature
  - ... or the difference between two absolute temperatures

4

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## COMPONENTS NOT CONNECTED TO OUTPUT

- An application may contain alternative sets of components to execute
  - Example: several controllers, but only one used
  - That controller is connected to the rest of the model, and the others unconnected
- To handle such cases, set the flag

**Advanced.Translation.OptimizeForOutputs = true**

- Code generated only for calculating the outputs of the complete model
  - For any unconnected components, no code is generated
  - Can improve simulation speed
  - In some cases also solve hard initialization problems

5



## PARALLELIZATION FOR EXTERNAL FUNCTIONS

- For parallelization involving external functions, it is important to:
  - Provide estimates of their complexity (in terms of the number of instructions per call)
  - New annotation `__Dymola_OperationCount`
  - Ensure that they are thread-safe and declare that
- This will allow Dymola to properly group code for parallel execution

```
function foo
...
  external"C" foo(...) annotation(Library="SomeLibrary");
  annotation(__Dymola_ThreadSafe=true, __Dymola_OperationCount=5000);
end foo;
```

6



## OTHERS

- Limitation that the total number of array elements is statically limited is removed
  - Automatic adjustment
- File > Save... > Save Total
  - New option to select Modelica Zip-archive with resources and complete packages
- String parameters enabled by default
  - Previously an option

7

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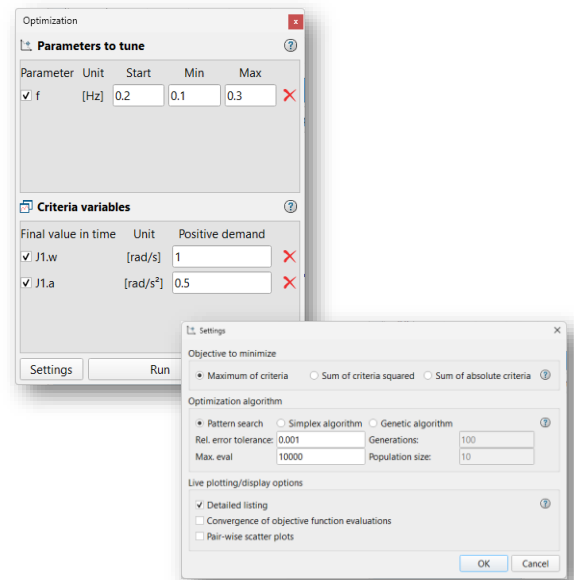
## SIMULATION

8

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## PARAMETER OPTIMIZATION

- Optimize models by tuning parameters
  - Several parameters can be tuned together
  - Minimize error of several combined variables
  - More than 3 tuners → requires DOZ-x option
- Simplified user interface
  - Drag-and-drop tuners and criteria
  - Simple selection of objective and algorithm
  - Detailed listing of optimization results
- Can create new model
  - Optimized parameters “plugged in”
- Traditional function interface still available
  - With more advanced optimization options



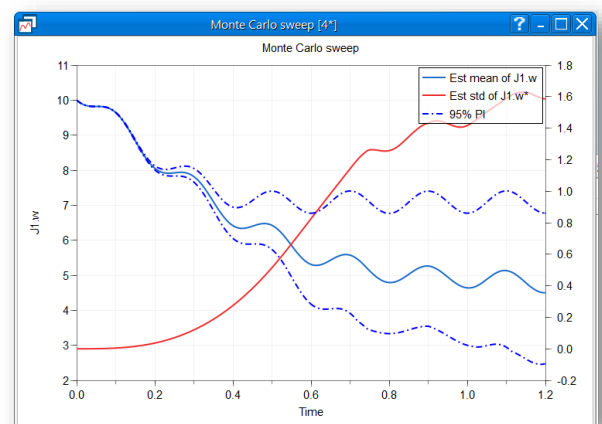
9

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## MONTE-CARLO SIMULATION

- Trajectory analysis
  - Mean value
  - Standard deviation
  - Prediction interval (user's choice)
- Box plot of observed variable
- Global sensitivity analysis
  - Sobol Indices
- Improved random number generator
  - Latin hypercube sampling by default
  - Leads to faster convergence



10

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# MORE SIMULATION

- Improved generation of analytic Jacobian
  - Possible to generate analytic Jacobian for models with dynamic state selection
  - Functions without derivatives and algorithms might still prevent analytic Jacobians
- FMI source code import
  - Must select either binary or source code when importing
- Input smoothing supported for FMI 2 and FMI 3

11



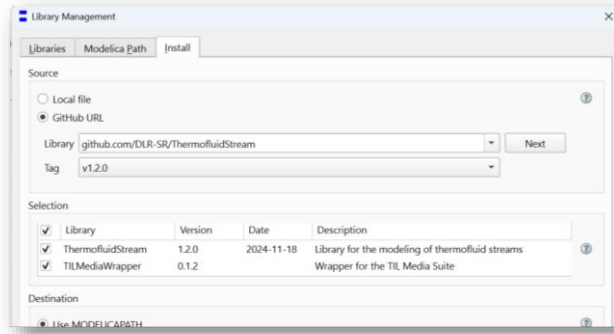
# OTHER NEWS

12



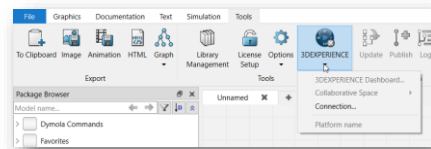
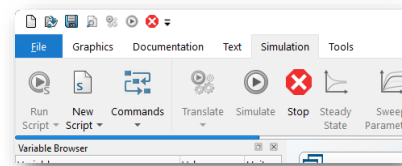
## DOWNLOADING AND INSTALLING LIBRARIES FROM GITHUB

- You can download and install libraries from GitHub
- Tools > Library Management



## MORE...

- New simulation progress indicator
  - Available by default when a simulation is running.
  - Turn off with `Advanced.UI.ProgressBar=false`
- 3DEXPERIENCE in the Tools ribbon
  - New *Remember Me* option at login
- Compatible with MSL 4.1.0 RC1
  - Will be default in a later release



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SYSTEM STRUCTURE AND PARAMETERIZATION

- Meta data to support creating the Commands menu in Dymola
  - Create figures, execute commands, run scripts, open models:

Key	Description
dymola.command.title	Plot inertia
dymola.command.caption	Plot first inertia velocity
dymola.command.auto	true
dymola.command.figure	{Plot(curves={Curve(x=time, y=J1.w, legend="First inertia")}, Y=Axis(label="Speed"))}

- Import CSV files according to proposed Modelica MAP-COORD format
- Unit conversion when importing SSP, SSD or SSV, disable by  
Advanced.SSP.ApplyUnitConversion=false

15



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FMI FOR EMBEDDED SYSTEMS

- Support for eFMI Standard 1.0.0 Beta 1
  - Experiment-packages now use the maxium of absolute and relative tolerance
  - Manifests of generated Behavioral Model containers
  - Reference trajectories files of generated Behavioral Model containers
- Support to generate MATLAB scripts that import a production code container
- Other
  - Expose the independent parameters of record instances as tunable parameters of the GALEC block-interface
  - eFMU co-simulation stubs now support multi-dimensional tunable Boolean parameters
  - Updated check code scripts to work with latest Cppcheck version

16

