Work flow tools

Morpheus has a number of nifty tools to optimize your work flow from model development to high performance computing.

Here, we present some use cases that use these features.

Model development and testing

Copy / paste between models

Multiscale modeling often involves the integration of existing models. For example, combining an existing cell-based CPM model (CPM.xml) with an ODE model (ODE.xml) regulating, say, the cell cycle of each cell.

Morpheus lets you copy and paste parts of a model between different documents.

This allows you to copy the `System` from ODE.xml containing the ODE equations and parameters (right-click → Copy). And then paste it inside the `CellType` element in the CPM.xml document (right-click → Copy).

You can only paste elements in appropriate places, otherwise it will be greyed out. This ensures the validity of the model.

All copied elements are shown in the `ClipBoard`.

Disable / enable

Testing models frequently involves switch things on and off to observe their effects. Morpheus allow you to do this without losing your contents by using Right-Click → `Disable`. The selected element and everything below it will be commented out in the XML file.

This mechanism also allows you to compare submodels.

For instance, two different versions of an ODE model inside a cell-based model.

- Interactive mode

Simulation and execution

- Image-based modeling
- Checkpointing
- In silico experiments

Parameter exploration

- Spatial parameter sweep
- Parameter sweeps
- Analysis of parameter sweeps

Analysis

- Logging and plotting raw data
- Frequency distributions / Histograms
- Colors / Labels / Arrows
- TIFF hyperstacks