Simulink-Library: *FoldingMechanisms*

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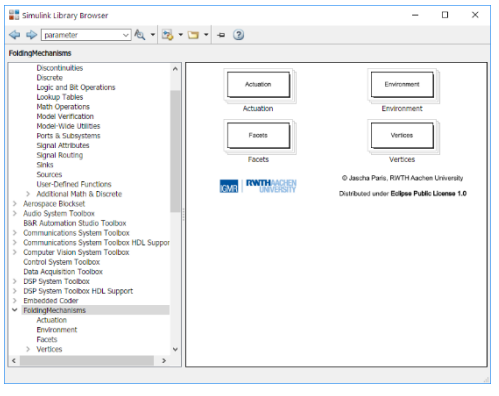
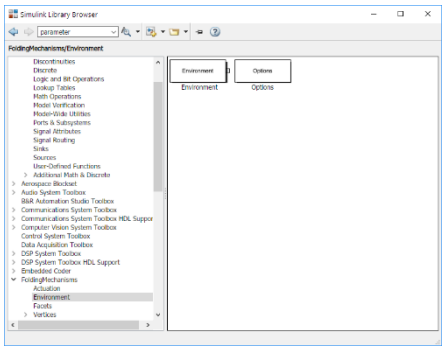


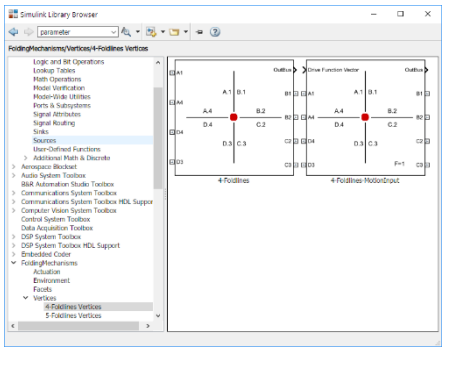
FoldingMechanisms:

This library for Simulink contains different elements, which enable the simulation of Folding Mechansims. For installation, it is required to place the files „FoldingMechanisms.slx“ and „slblocks.m“ in the MATLAB path.

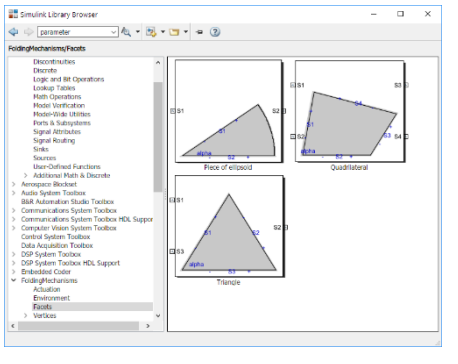
Environment:



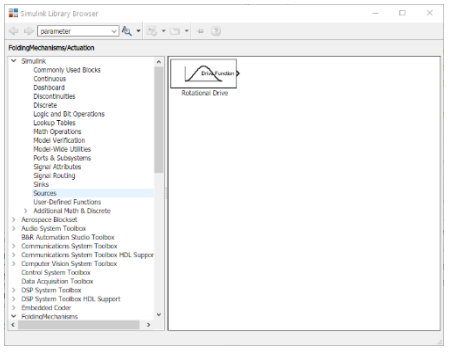
Vertices:



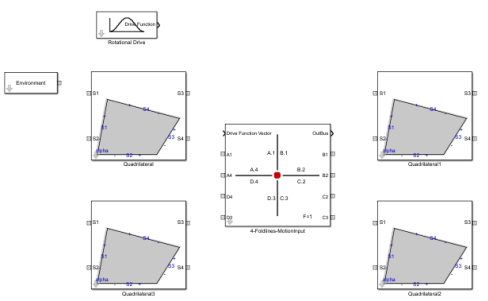
Facets:



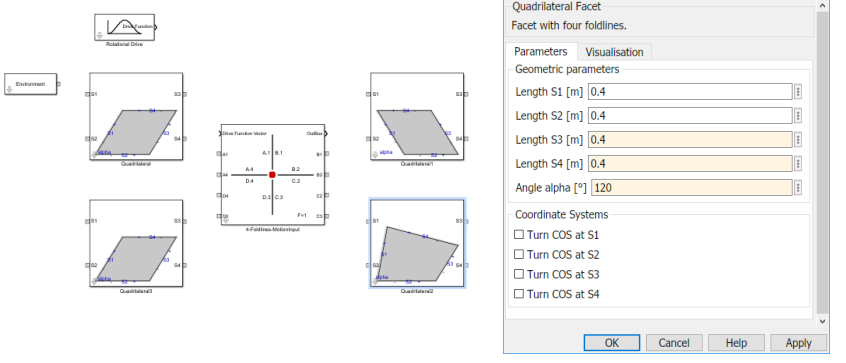
Drives:



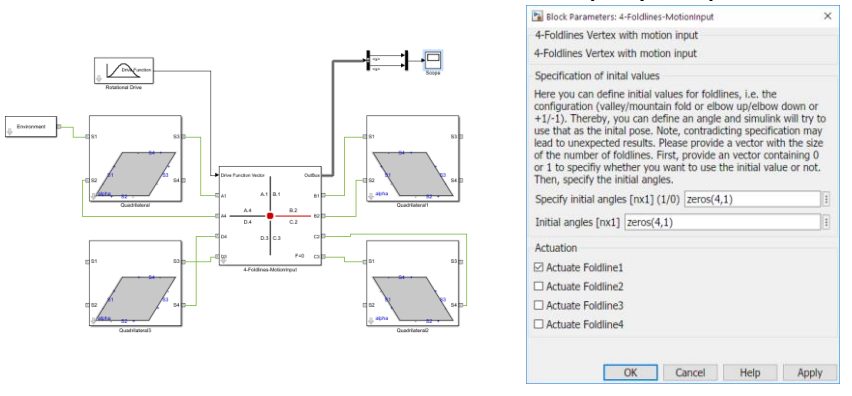
Step 1:
First, all required blocks for the first vertices are added to the simulation model. These are an "environment" block, a vertex and the right number of facets. Here it should be said that models should be built up piece by piece.



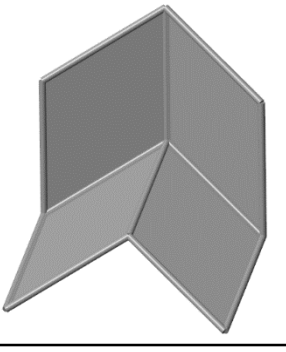
Step 2:
The correct parameters should then be selected. These are the dimensions of the facets and the adaptation of the coordinate systems. For the edges of two facets that are to be joined, the signs at the edges must be the same (+ / - symbols).

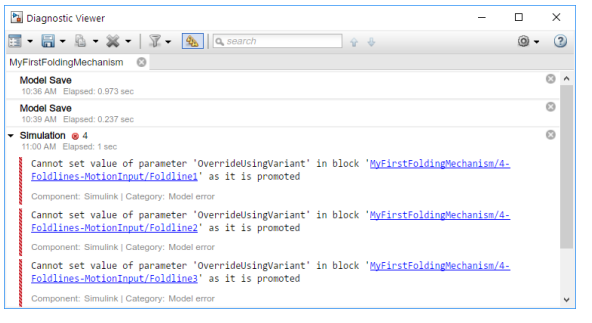


Step 3:
Then the surfaces and the vertices can be connected. The graphic representation of the folding surfaces helps to draw the right connections. For large folding mechanisms this should be done step by step.



Step 4:
After the simulation, the folding pattern can be visualized directly. There are two known issues. The one below can be avoided by restarting the simulation again. The other one can be worked around by deactivating and activating again the driven foldline.





Designing Deployable Folded Plate Structures

Jascha Paris, Judith Merz, Mathias Hüsing, Burkhard Corves