Example 29: Create a multi body simulation using several mass points

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Summary of the already explained aspects of the VLFL-Toolbox

The previous examples of this series covered the following topics:

- Example 01: First Steps Using the VLFL-Toolbox for Solid Object Design
- Example 02: Using the VLFL-Toolbox for STL-File Export and Import
- Example 03: Closed 2D Contours and Boolean Operations in 2D
- Example 04: 2.5D Design Using Boolean Operators on Closed Polygon Lists (CPL)
- Example 05: Creation, Relative Positioning and Merging of Solid Geometries (SG)
- Example 06: Relative Positioning and Alignment of Solid Geometries (SG)
- Example 07: Rotation of Closed Polygon Lists for Solid Geometry Design
- Example 08: Slicing, Closing, Cutting and Separation of Solid Geometries
- Example 09: Boolean Operations with Solid Geometries
- Example 10: Packaging of Sets of Solid Geometries (SG)
- Example 11: Attaching Coordinates Frames to Create Kinematik Models
- Example 12: Define Robot Kinematics and Detect Collisions
- Example 13: Mounting Faces and Conversion of Blocks into Leightweight-structures
- Example 14: Manipulation Functions for Closed Polygons and Laser Cutting (SVG)
- Example 15: Create a Solid by 2 Closed Polygons
- Example 16: Create a Solid along a contour
- Example 20: Programmaticaly Interface to SimMechanics Multi-Body Toolbox
- Example 21: Programmaticaly Design of SimMechanisms Mechanisms and Simulink Signals
- Example 22: Creation of fixed nodes for the assembly of joints
- Example 23: Automatic Creation of a Missing Link and 3D Print of a Complete Model
- Example 24: Automatic Creation of a Joint Limitations
- Example 25: Automatic Creation of Video Titels, Endtitels and Textpages

- Example 26: Create Mechanisms using Universal Planar Links
- Example 27: Fourbar-Linkage: 2 Pose Syntheses and Linkage Export for 3D Printing
- Example 28: Fourbar-Linkage: 3 Pose Syntheses and Linkage Export for 3D Printing
- Example 29: Create a multi body simulation using several mass points

```
% function VLFL_EXP29
```

Motivation for this tutorial

Showing a finite element mass spring system

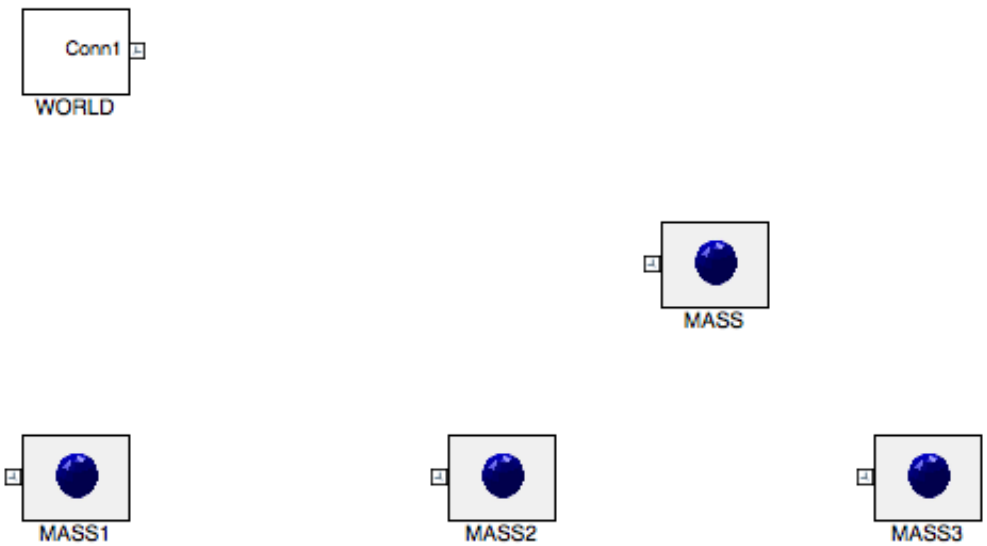
1. Create a SimMultiBody system for a Mass - Spring - Damper - System

```
smbNewSystem ('SG_LIB_EXP_29',[0 0 -9.81])   % Creates the mechansim diagramm
```

```
Creating temporary directory '/Users/lueth/Desktop/tmp_SG_LIB_EXP_29/'
```

2 Create four mass points

```
smbCreateSGMass;
smbCreateSGMass;
smbCreateSGMass;
smbCreateSGMass;
smbDrawNow;
```

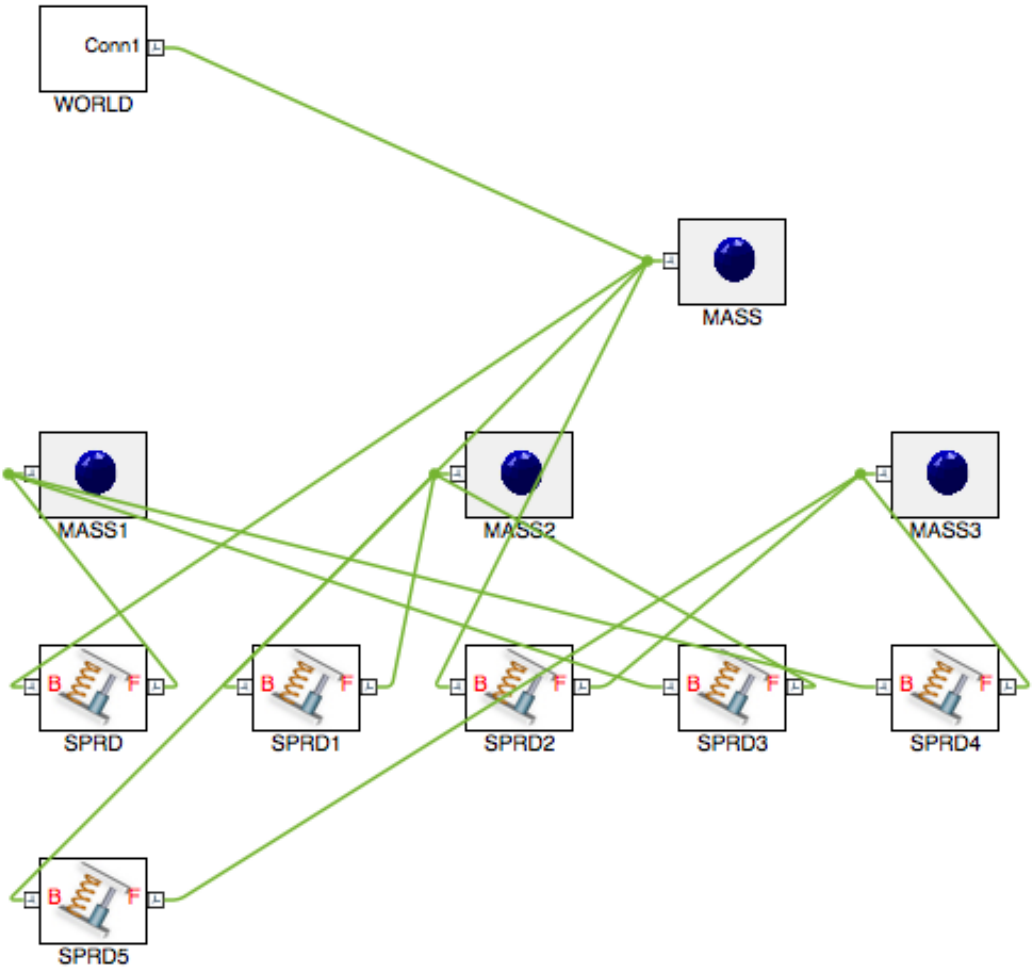


2 Create six springs between the masses

```
smbCreateSpring('MASS','MASS1');
smbCreateSpring('MASS','MASS2');
smbCreateSpring('MASS','MASS3');
smbCreateSpring('MASS1','MASS2');
smbCreateSpring('MASS1','MASS3');
smbCreateSpring('MASS2','MASS3');
```

3. Connect the mass - spring - damping system to the world coordinate system

```
smbAddLine( 'WORLD/RConn1', 'MASS/LConn1');
ID=smbDrawNow;
```



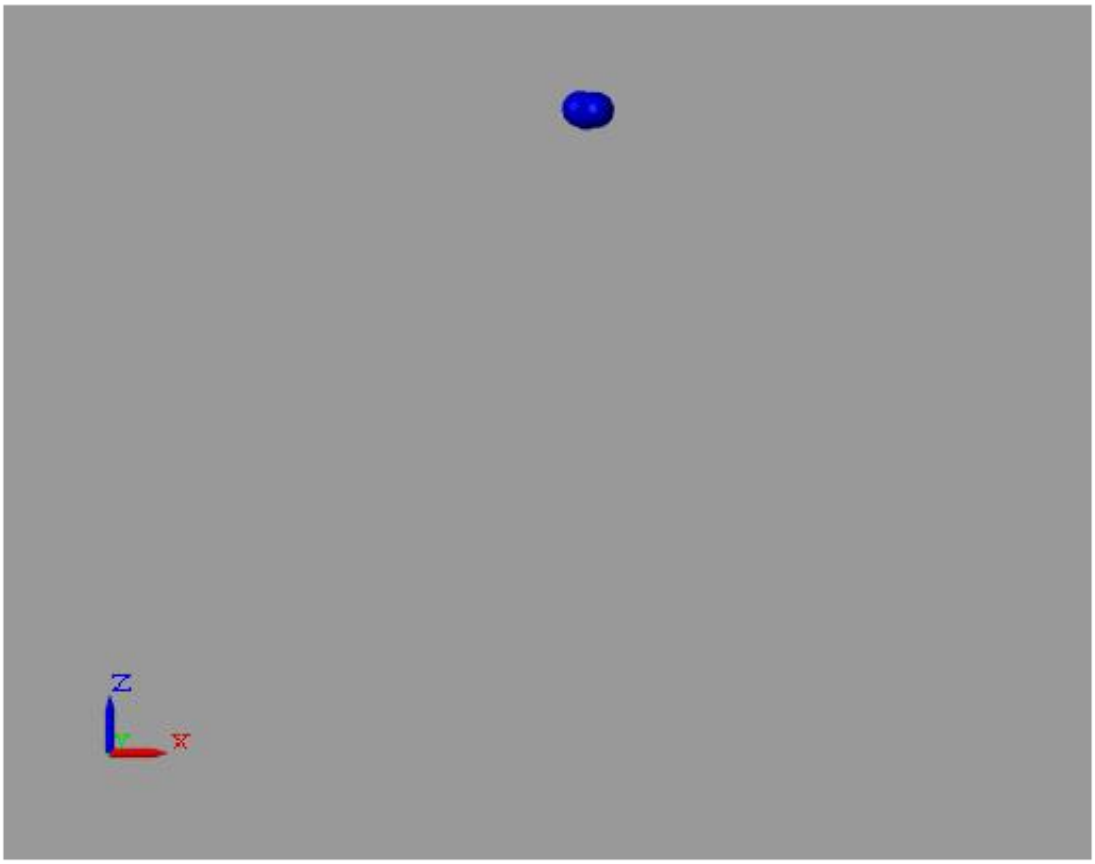
4. Show the Simulation

6. Create a Video of the Linkage Simulation

```
[I1,vname]=smbVideoSimulation (4);    % Simulate for 1 second
IT=imageVideoTitle(vname,{'SG-Lib Tutorial #29','Mass-Spring-Nets','Tim C. Lueth','$date'},
'',[0 4]);
```

```
IE=imageVideoEndtitle(vname);
videoWriteClipMovie(smbFilename('SG-Lib Tutorial #29-Mass-Spring-Nets.avi'),IT,2,ID,1,vname
,IE,1);
imshow(I1);
```

```
.....Creating a new video file (NO SOUND/2016b): '/Users/lueth/Desktop/tmp_SG_LIB_EXP_29/SG
-Lib Tutorial #29-Mass-Spring-Nets.avi'
5% 10% 15% 20% 25% 30% 35% 40% 45% 50% 55% 60% 65% 70% 75% 80% 85% 90% 95% 100%
```



Final Remarks

```
close all
VLFLlicense
```

```
This VLFL-Lib, Rel. 3.6 (2017-Mar-23), is for limited non commercial educational use only!
Licensee: Tim Lueth (Development Version)!
Please contact Tim Lueth, Professor at TU Munich, Germany!
WARNING: This VLFL-Lib (Rel. 3.6) license will exceed at 25-Dec-2071 05:57:55!
Executed 23-Mar-2017 05:57:57 by 'lueth' using Matlab 9.1.0.441655 (R2016b) on a MACI64
======================================== Used Matlab products: ============================
==========
image_toolbox
```

```
map_toolbox
matlab
simmechanics
simscape
simulink
================================================================================================
==========
```

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