Tutorial 12: Define Robot Kinematics and Detect Collisions

2015-08-09: Tim C. Lueth, MIMED - Technische Universität München, Germany (URL: http://www.mimed.de) - Last Change: 2017-07-07

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Complete List of all Tutorials with Publishable MATLAB Files of this Solid-Geoemtries Toolbox

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Motivation for this tutorial: (Originally SolidGeometry 2.4 required)

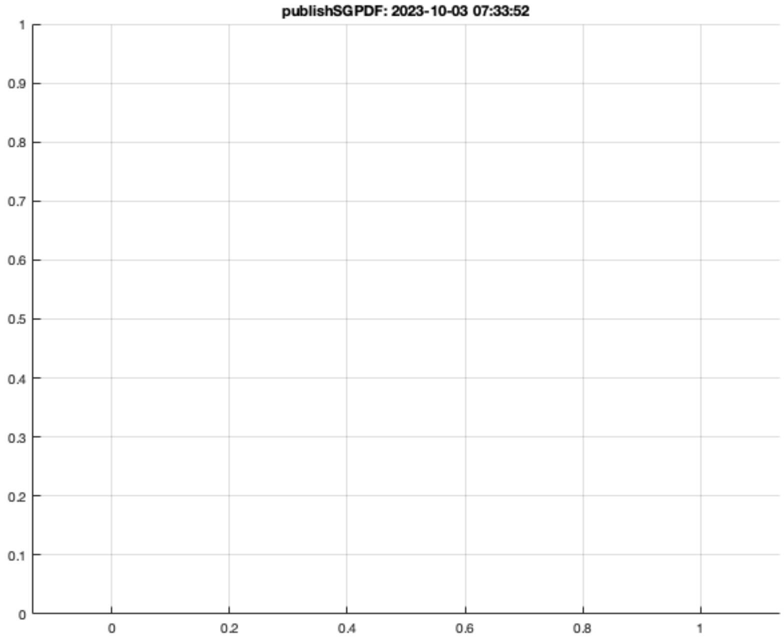
2. Loading the 5 components of a 4DoF robot solid model as last time

Before explaining how to create the parts of a robot kinematik we just load such components in. The command line load AIM_robot function VLFL_EXP12 % Must run as a scipti because of loadweb

```
close all; SGfigure;
loadweb ('AIM_SGrobot.mat')
SG0=SGfixerrors(SG0,1e-3); SGchecker(SG0);
SG1=SGfixerrors(SG1,1e-3); SGchecker(SG1);
SG2=SGfixerrors(SG2,1e-3); SGchecker(SG2);
SG3=SGfixerrors(SG3,1e-3); SGchecker(SG3);
SG4=SGfixerrors(SG4,1e-3); SGchecker(SG4);
% save ('AIM_SGrobot','SG0','SG1','SG2','SG3','SG4','SGrobot');
```

```
VLFLplotlight(1,0.8);
```

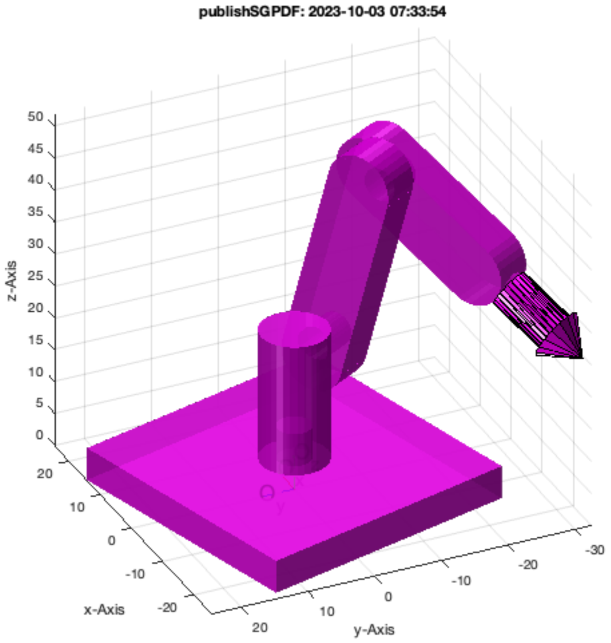
```
loadweb: Access path to changed from "www.mimed.mw.tum.de" to "www.mw.tum.de/mimed/" in 2020 Aug.
loadweb: Access path to changed from "www.mw.tum.de/mimed/" to "www.mec.ed.tum.de/mimed/" in 2021 Nov.
Downloading "https://www.mec.ed.tum.de/fileadmin/w00cbp/mimed/Matlab_Toolboxes/AIM_SGrobot.mat" into: /Volumes/LUETH-WIN/WIN AIM Matlab Libraries/Solid
ans =
    '/Volumes/LUETH-WIN/WIN AIM Matlab Libraries/SolidGeometry-Code/downloaded_AIM_SGrobot.mat'
```



3. Automatic creation of a the robot

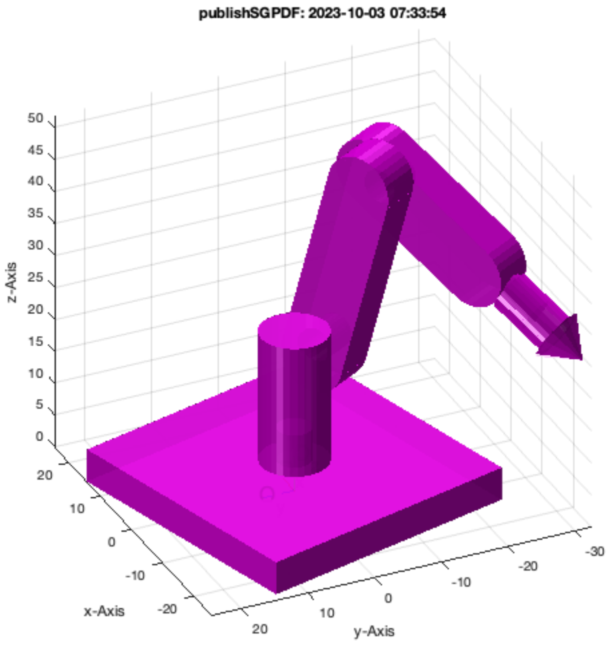
```
KMofSGs({SG0,SG1,SG2,SG3,SG4});
```

```
KMofSGs: No collisions found for tolerance: 0.10
```



3. Collision in the joint by the resolution of the surfaces

```
[KM,XVL]=KMofSGs({SG0,SG1,SG2,SG3,SG4},[],0.05);
KMplot(KM,'m'); VLFLplotlight (1,0.9);
```

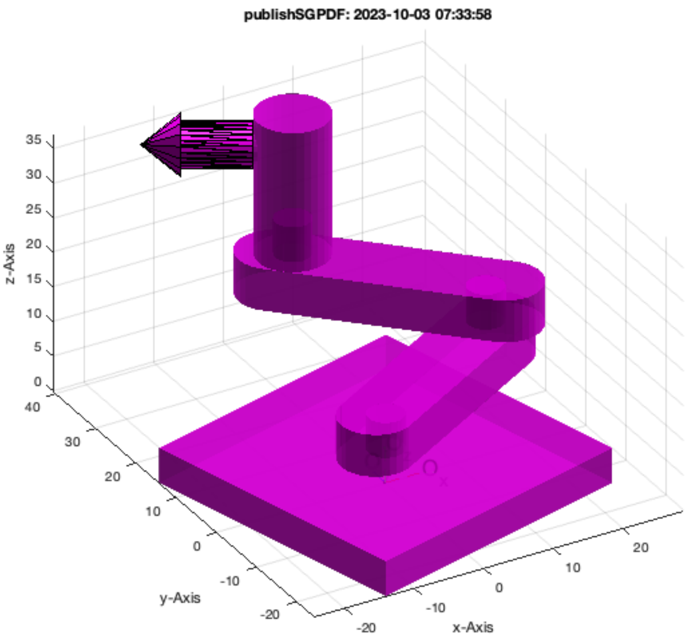


```
if ~isempty(XVL); zoompatch(XVL); VLplot(XVL,'k*',10);  end;
```

4. Showing a different robot

```
KMofSGs({SG0,SG2,SG2,SG1,SG4});
view(-30,30);
```

```
KMofSGs: No collisions found for tolerance: 0.10
```

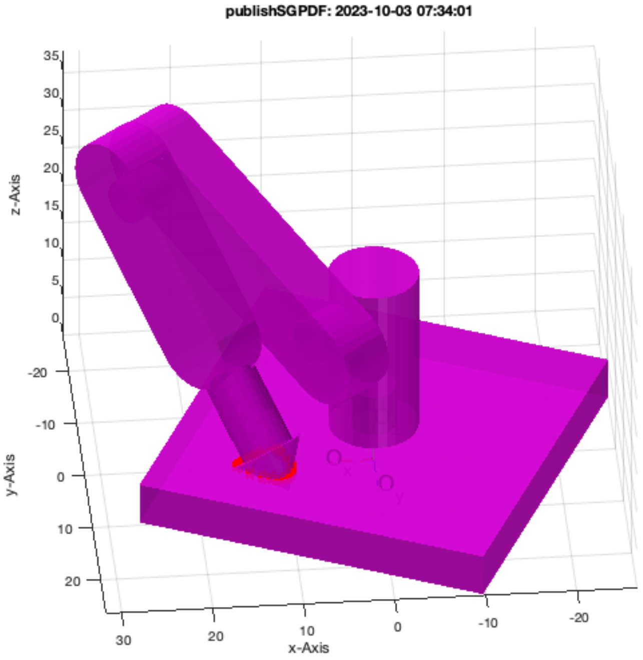


5. Showing a self collision of a robot

```
KMofSGs({SG0,SG1,SG2,SG3,SG4},155);
```

```
view(-185,35); VLFLplotlight(1,0.8);
```

```
Warning in KMofSGs: 102 collisions found for tolerance: 0.10
```



Final remarks on toolbox version and execution date

```
VLFLlicense
```

```
This VLFL-Lib, Rel.  (2023-Oct-03), 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. ) license will exceed at 06-Jul-2078 07:34:02!
Executed 03-Oct-2023 07:34:04 by 'timlueth' on a MACI64 using Mac OSX 13.6 | R2023a Update 5 | SG-Lib 5.4
======================================== Used Matlab products: ======================================
database_toolbox
distrib_computing_toolbox
fixed_point_toolbox
image_toolbox
map_toolbox
matlab
optimization_toolbox
pde_toolbox
phased_array_system_toolbox
signal_blocks
signal_toolbox
simmechanics
simscape
simulink
statistics_toolbox
=====================================================================================================
```

- *Tim Lueth, tested and compiled on OSX 10.7.5 with Matlab 2014b on 2015-06-08*
- __________, executed and published on 64 Bit PC using Windows with Matlab 2015a on 2015-xx-xx_

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