

WEEK 2

We'll be starting with Week 2 of the course. This week deals with learning and then modelling some basic systems on Simscape Multibody.

SIMSCAPE MULTIBODY

Simscape Multibody provides a multibody simulation environment for 3D mechanical systems, such as robots, vehicle suspensions, construction equipment, and aircraft landing gear. You can model multibody systems using blocks representing bodies, joints, constraints, force elements, and sensors. Simscape Multibody formulates and solves the equations of motion for the complete mechanical system. You can import complete CAD assemblies, including all masses, inertias, joints, constraints, and 3D geometry, into your model. An automatically generated 3D animation lets you visualize the system dynamics.

Simscape Multibody helps you develop control systems and test system-level performance. You can parameterize your models using MATLAB variables and expressions, and design control systems for your multibody system in Simulink. You can integrate hydraulic, electrical, pneumatic, and other physical systems into your model using components from the Simscape family of products. To deploy your models to other simulation environments, including hardware-in-the-loop (HIL) systems, Simscape Multibody supports C-code generation.

TUTORIALS

The best place to get started with Simscape Multibody is its official documentation itself. All the step-wise learning tutorials and other explanation text can be found [here](#).

For getting to know all the basic blocks and the best design workflow to follow for modelling any system you will for now need to go through only the first six tutorials listed below.

1. [Analyse a Simple Pendulum](#)
2. [Model a Simple Link](#)
3. [Model a Simple Pendulum](#)
4. [Start a Model from a Template](#)
5. [Creating a Multibody Model](#)
6. [Multibody Model Anatomy](#)

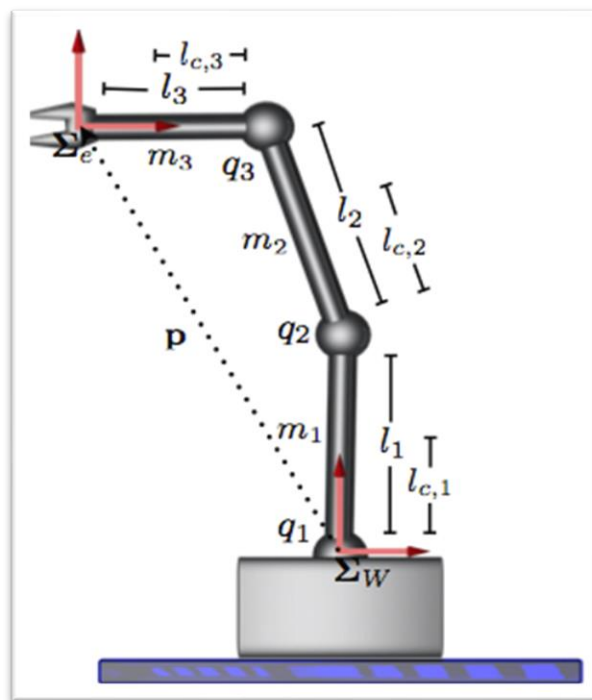
These six tutorials will cover all the basics for Simscape Multibody, but we encourage you to read through other tutorials as well for better advanced learning.

ASSIGNMENT

Your task this week is to create a simple Multibody model of a 3 Degrees of Freedom Robotic Arm. Some guidelines to follow for creating the model are –

- The arm should have at least 3 joints. The type of joints – revolute, prismatic etc. – is your own choice.
- The arm should not be redundant i.e., all the joints should provide some purpose and not be there just for the sake of it.
- You can use simple shapes such as – rectangles, cylinders etc. – for making the arm structure.
- The joints and transforms should be defined properly.
- The model should be able to move when simulation is run by giving some inputs to the Joints blocks.
- Lastly name the blocks appropriately and if needed do add comments in the block diagram you create.

An example robotic arm image is attached here **just for reference**. You are encouraged not to copy the exact arm structure.



SUBMISSION

You need to submit the **.slx** file of the model, name the file as “Week2.slx”.

Submission deadline is **20th July 11:59 PM**. (No extensions will be given this time around)