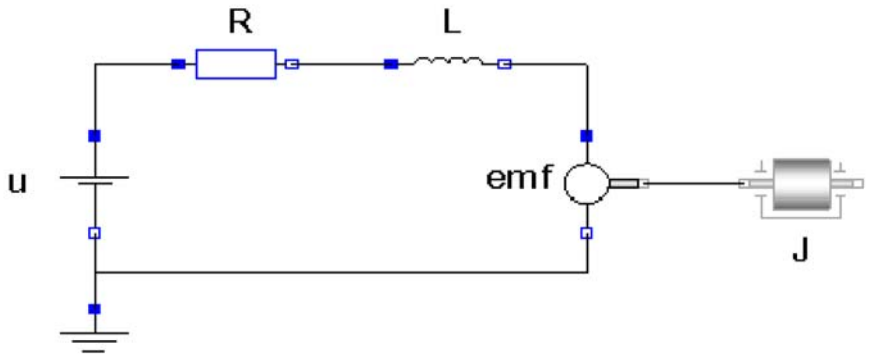
Exercise - Graphical Modeling

1The DC Motor

A) DC Motor

Make a simple DC-motor using the Modelica standard library that has the following structure:




```
model ...
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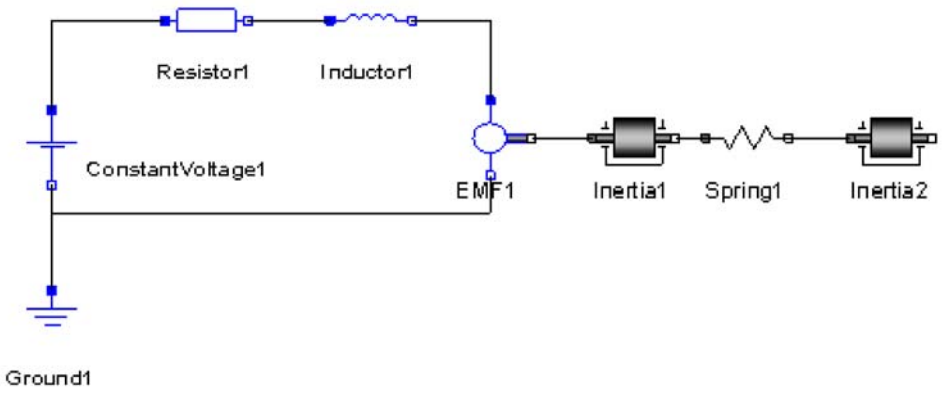
If you are using MathModelica Lite, first save the model from the graphic editor, load it (or alternatively copy paste it from the textual view in the graphic editor to OMNotebook or OMShell)

Simulate it (using OMShell or OMNotebook or MathModelica System Designer) for 15s and plot the variable the outgoing rotational speed on the inertia axis and the voltage on the voltage source (denoted u in the figure) the same plot.

Note: If you are using MathModelica System Designer you can do the plotting directly in the tool without cop the model into OMShell or OMNotebook.
Hint: if you have difficulty finding the names of the variables to plot, you can flatten the model by calling instantiateModel, which exposes all variable names

B) Spring and Inertia

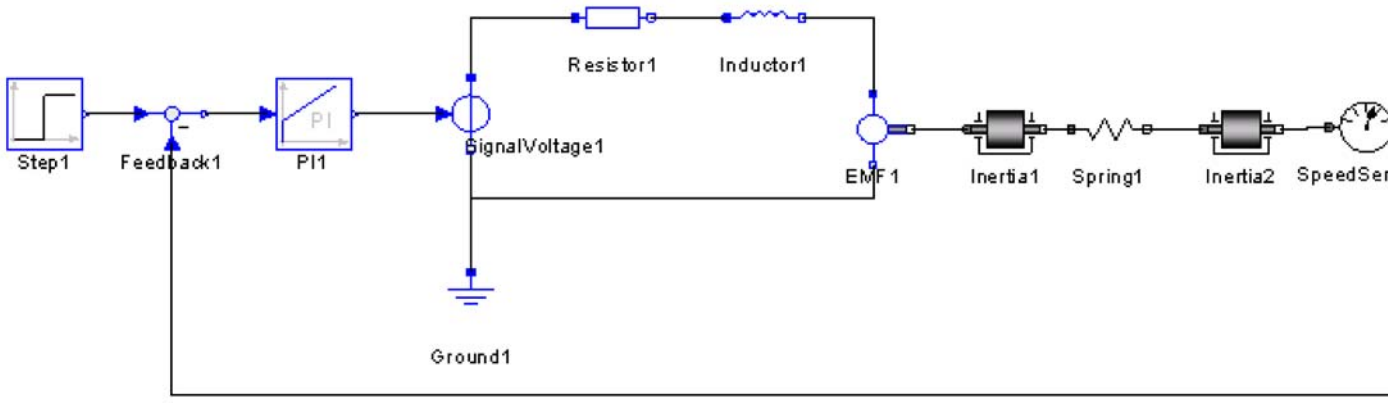
Add a torsional spring to the outgoing shaft and another inertia element. Simulate again and see the results. Ad
some parameters to make a rather stiff spring.




```
model ...
```

C) Adding controller

Add a PI controller to the system and try to control the rotational speed of the outgoing shaft. Verify the result
using a step signal for input. Tune the PI controller by changing its parameters in MathModelica System Desig
(or Lite).




```
model ...
```