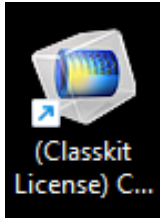


# ENR145 Computational Methods: COMSOL speed run

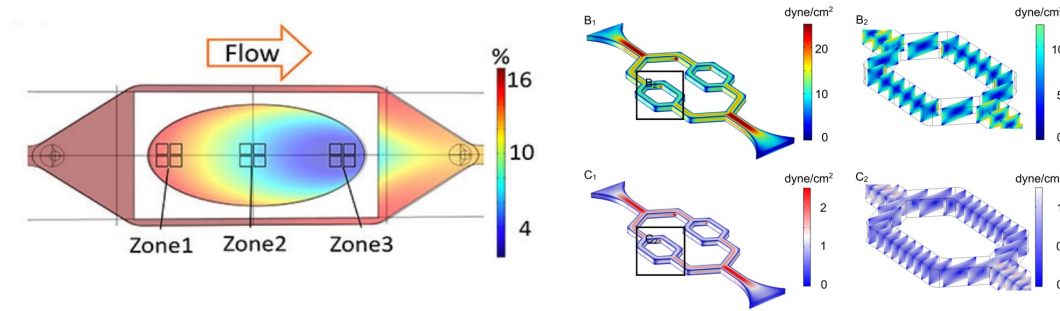
Xiang Li  
Spring 2026

# COMSOL is easy if you don't do math

Step 1: start COMSOL



Step 2: run simulation



Step 3: have educated guess about everything multiphysics

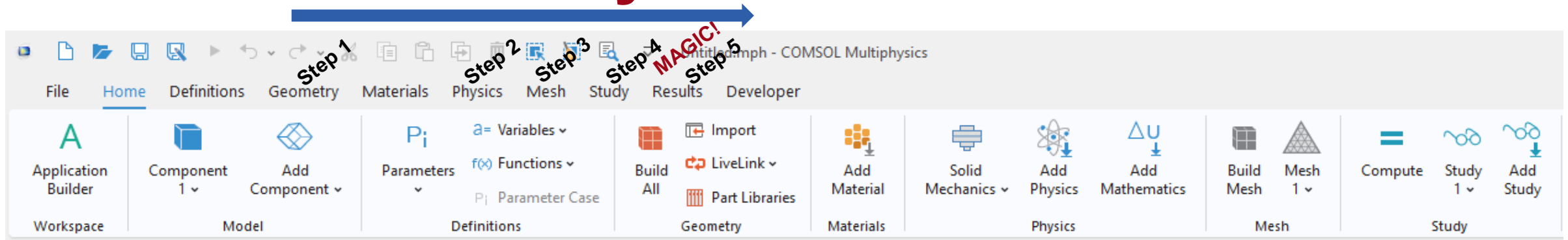
# This is how you start a simulation

The screenshot shows the initial setup of a simulation in a software interface. On the left, a 'File' menu is open, showing 'New' options: 'Model Wizard' and 'Blank Model'. The main workspace is divided into three panels:

- Select Space Dimension:** This panel offers six options: 3D (cube icon), 2D Axisymmetric (cylinder icon), 2D (circle icon), 1D Axisymmetric (rod icon), 1D (line icon), and 0D (dot icon). Below these options, a text instruction reads: "If your computer is slow, try 2D, 1D or 0D."
- Select Physics:** This panel contains a tree view of physics categories. The 'Solid Mechanics (solid)' option is selected and highlighted in blue. Other categories include 'Fluid Flow', 'Heat Transfer', and 'Structural Mechanics'.
- Select Study:** This panel shows a list of study types under 'General Studies'. The 'Stationary' study type is selected and highlighted in blue. Below the list, there are sections for 'Added study:' (containing 'Stationary') and 'Added physics interfaces:' (containing 'Solid Mechanics (solid)'). At the bottom, there are navigation buttons: a back arrow, 'Physics', 'Help', 'Cancel', and 'Done'.

A large blue arrow points from the 'Select Space Dimension' panel towards the 'Select Study' panel, indicating the flow of the simulation setup process.

# That's how you build a simulation:



Step 1: Geometry

Step 2: Physics

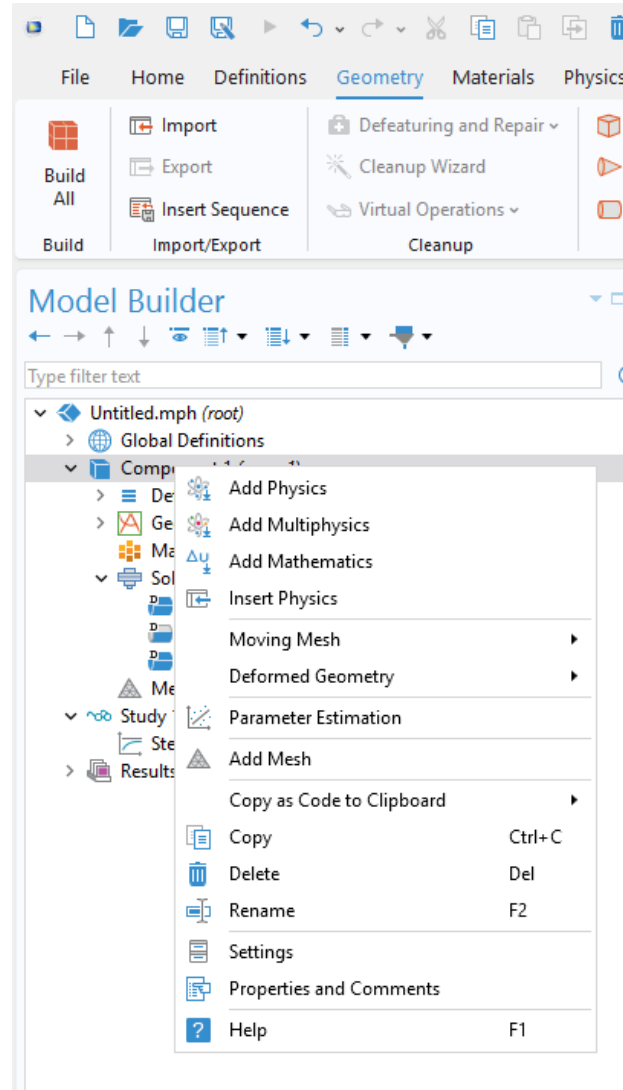
Step 3: Mesh

Step 4: Study (pre-processing)

Computational work will be done by COMSOL here.

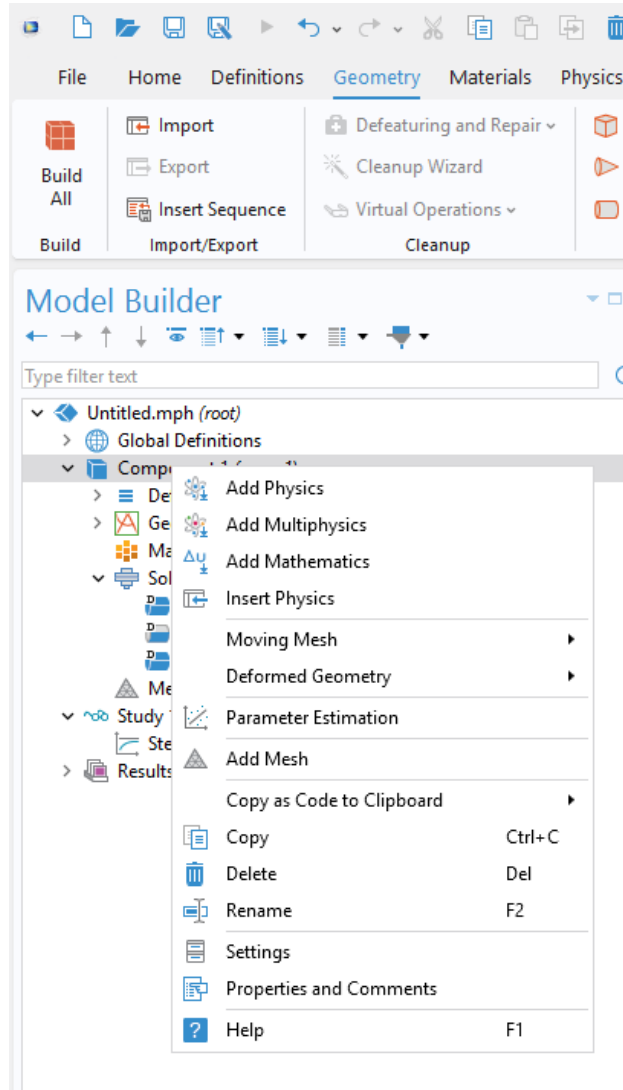
Step 5: Results (post-processing)

# The most crucial skill in COMSOL is to right-click.



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# Step 1: Geometry

Step 1: Geometry

Step 2: Physics

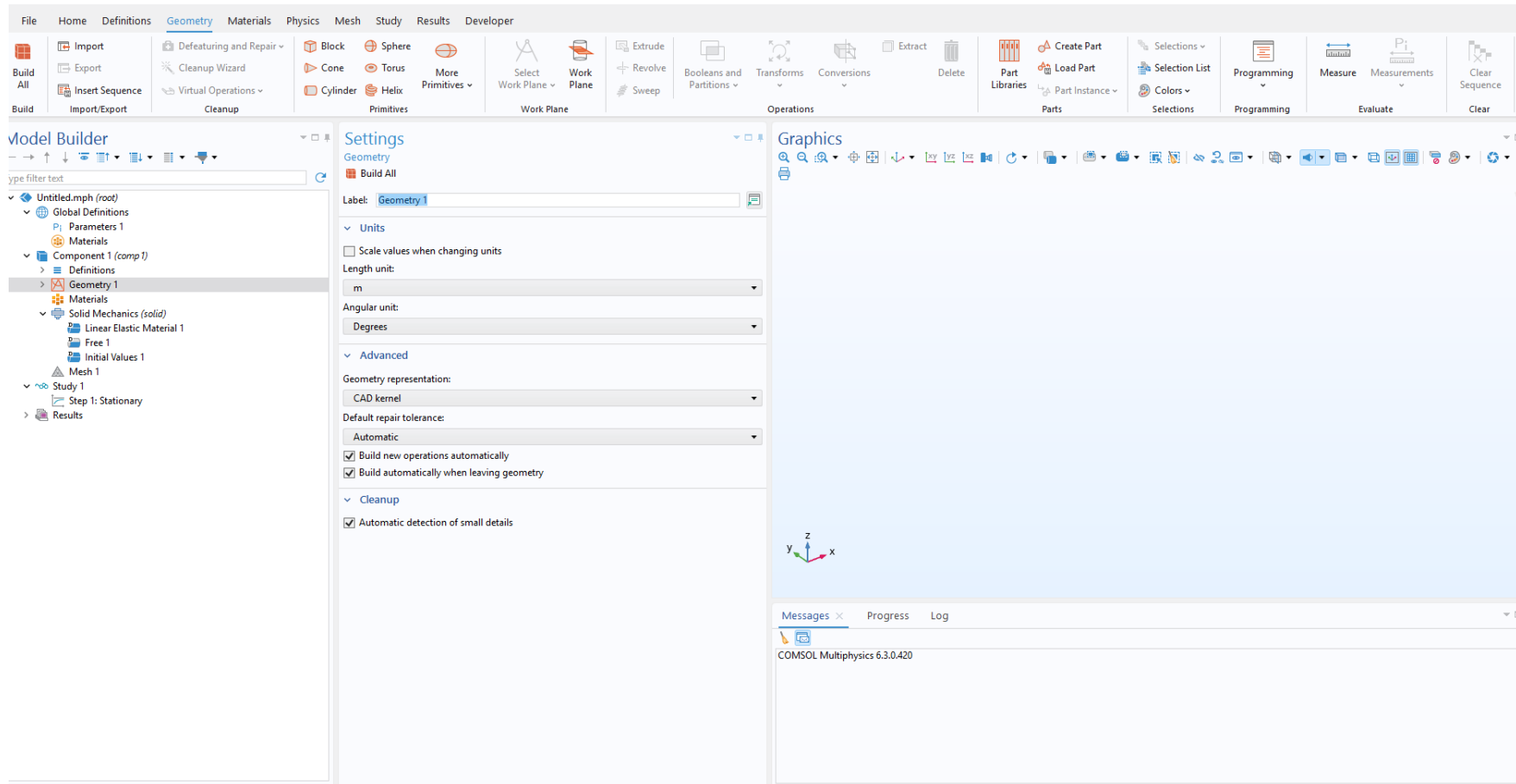
Step 3: Mesh

Step 4: Study (pre-processing)

Computational work will be done by COMSOL here.

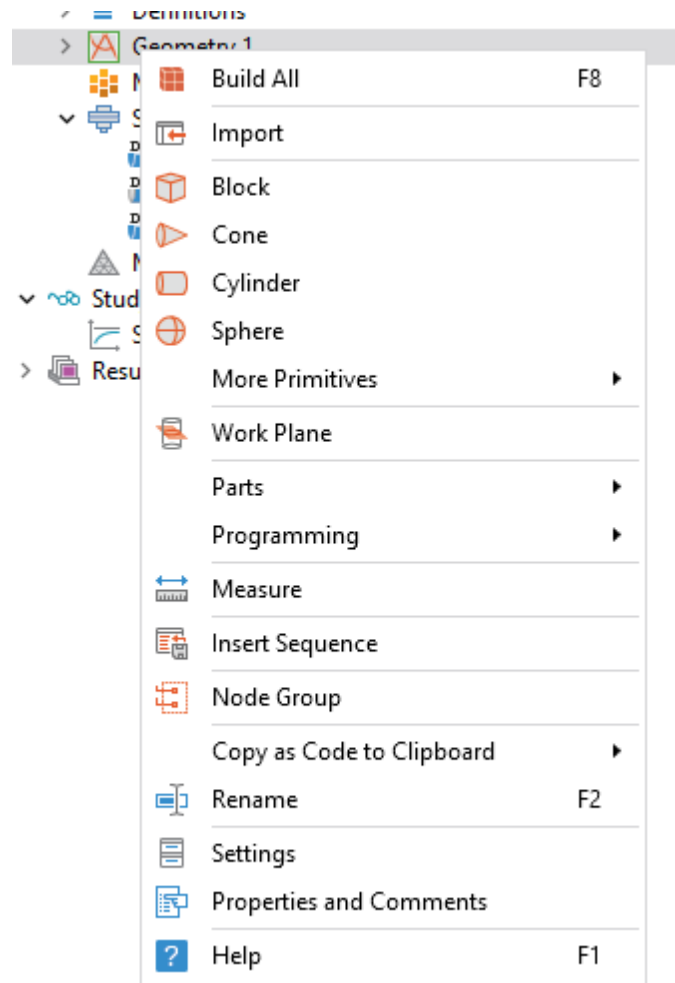
Step 5: Results (post-processing)

COMSOL's CAD tool sucks. Use anything else other than COMSOL.

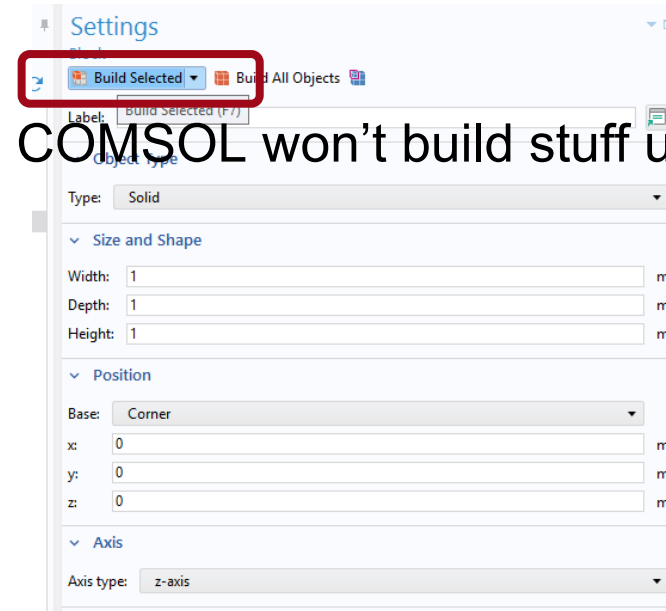


# Step 1: Geometry

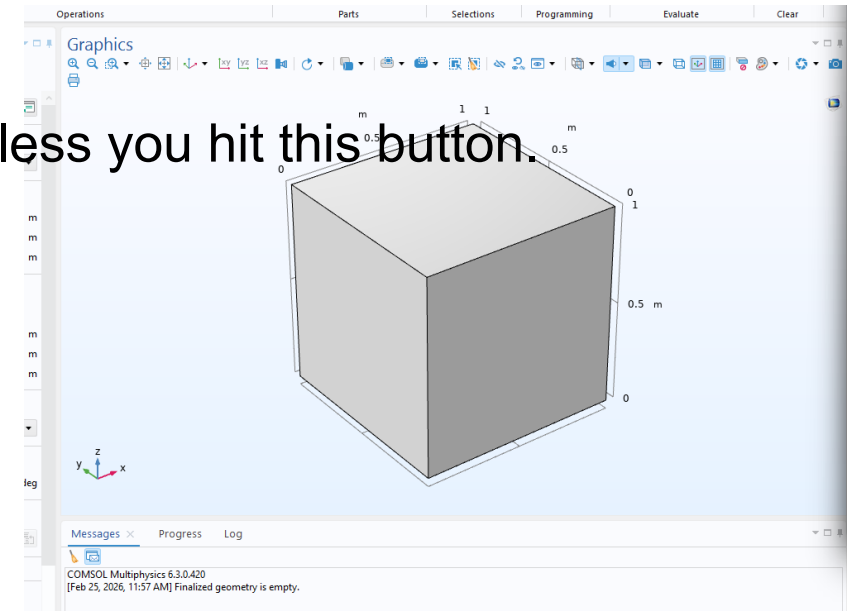
- Step 1: Geometry
  - Step 2: Physics
  - Step 3: Mesh
  - Step 4: Study (pre-processing)
  - Step 5: Results (post-processing)
- Computational work will be done by COMSOL here.



If you have to, right click on geometry and enjoy!

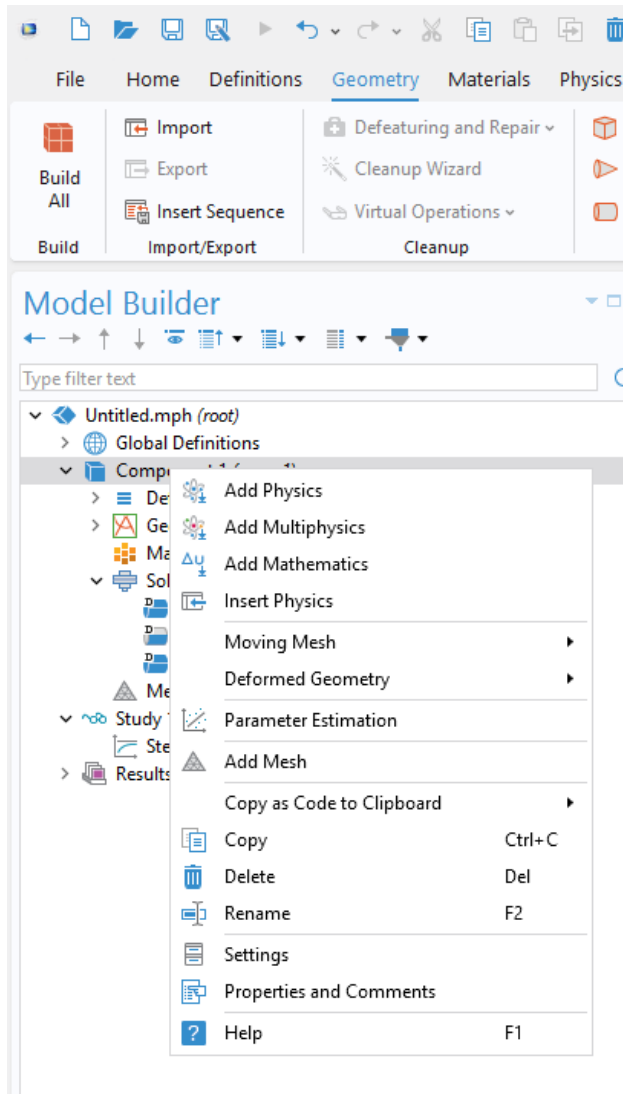
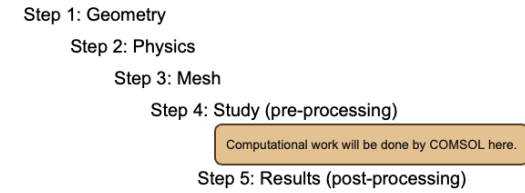


COMSOL won't build stuff unless you hit this button.



The most crucial skill in COMSOL is to right-click.

# Step 2: Physics



You can right-click and add ANY physics you like.

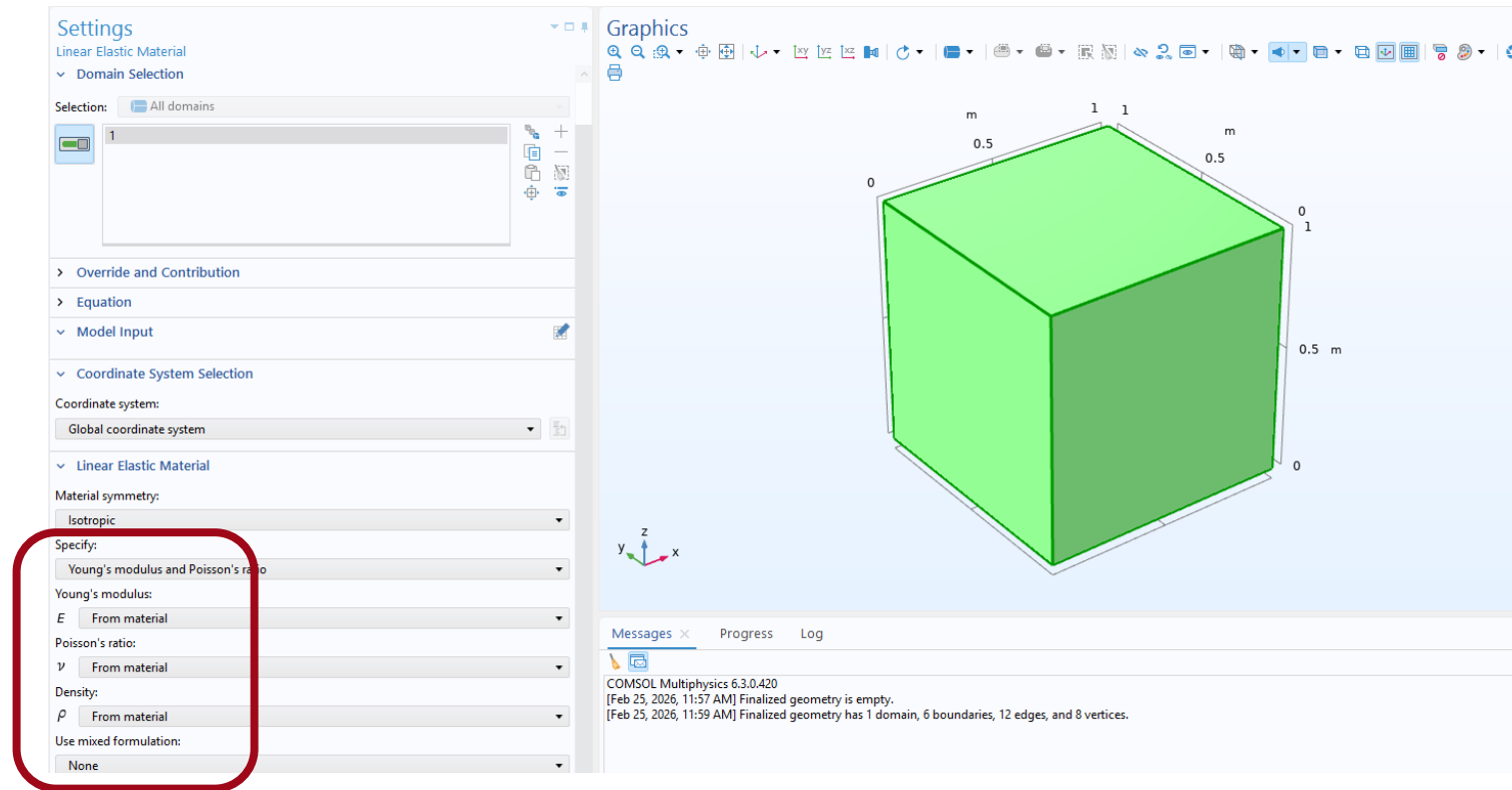
You can right-click and add ANY physics to any geometry (domain) you like.

You can link one variable from one physics to another, hence “Multiphysics”.

**The most crucial skill in COMSOL is to right-click.**

# Step 2: Physics

- Step 1: Geometry
- Step 2: Physics
- Step 3: Mesh
- Step 4: Study (pre-processing)  
Computational work will be done by COMSOL here.
- Step 5: Results (post-processing)



Here for structural mechanics, we need nothing much.

The most crucial skill in COMSOL is to right-click.

# Step 4: Study

- Step 1: Geometry
  - Step 2: Physics
  - Step 3: Mesh
  - Step 4: Study (pre-processing)
  - Step 5: Results (post-processing)
- Computational work will be done by COMSOL here.

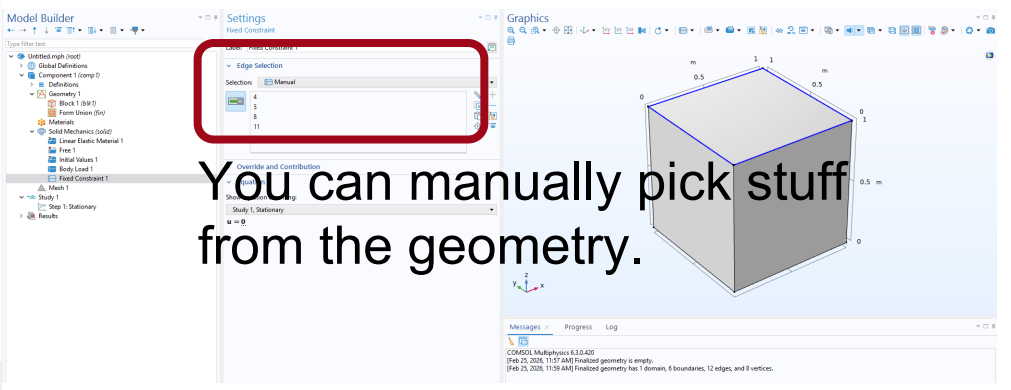
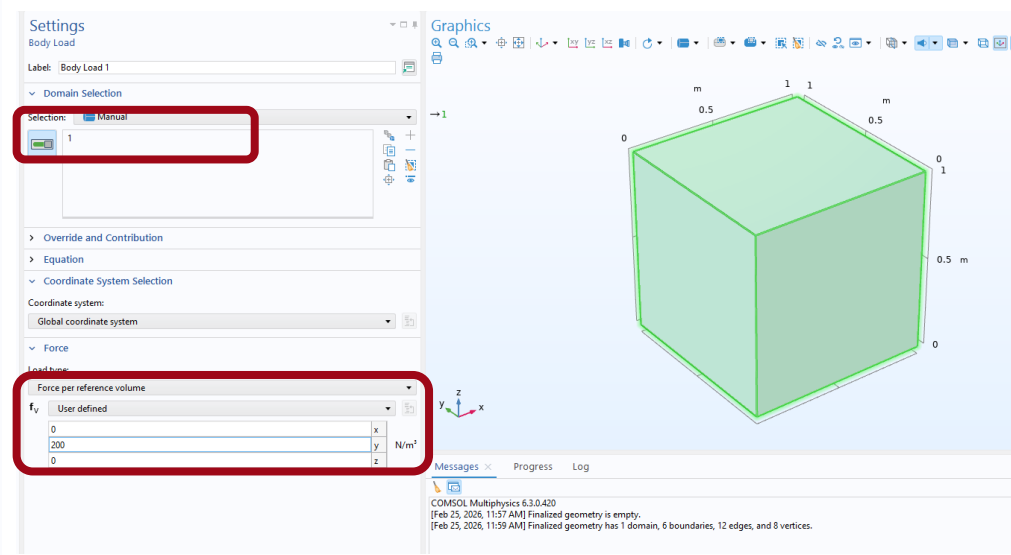
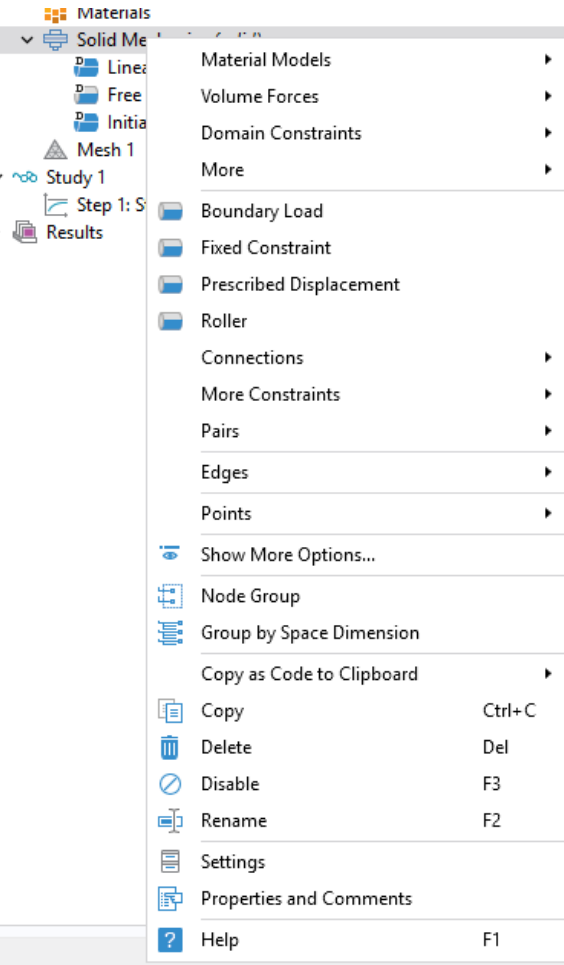
Mesh can be generated anytime after geometry.

To add study components, right-click and add components.

For structural, we need force and constraints.

There are many different types of force and constraints, some of them are applied on bodies, some of them on points.

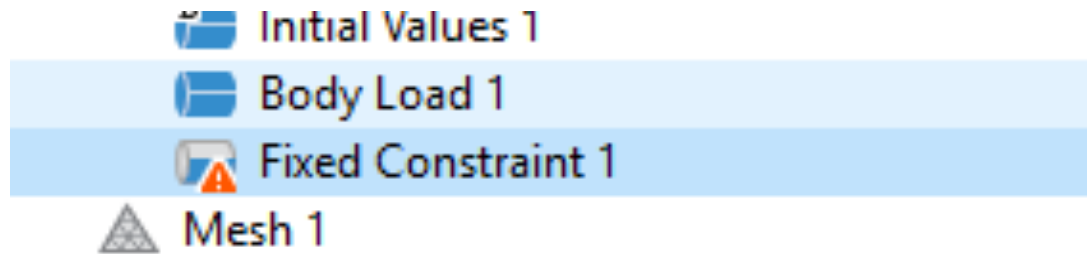
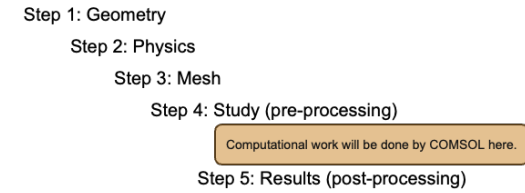
You can manually pick stuff from the geometry.



The most crucial skill in COMSOL is to right-click.



# Step 4: Study



If you see this sign, COMSOL is not pleased with your math or settings.

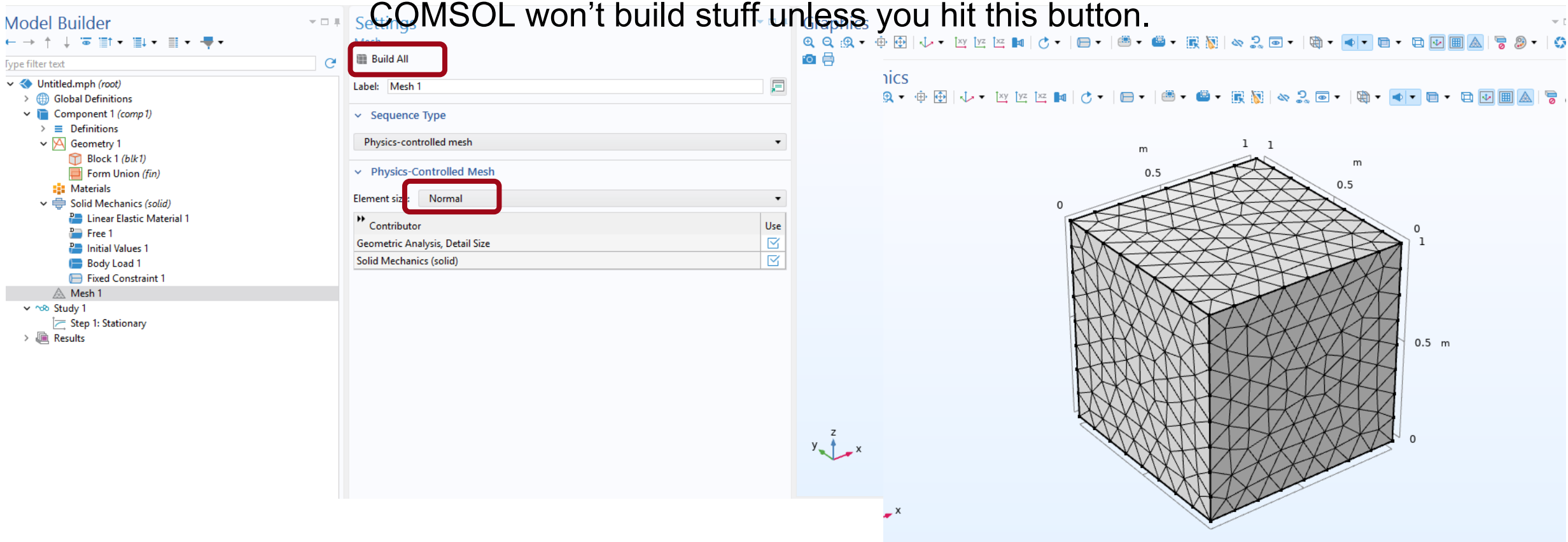
The most crucial skill in COMSOL is to right-click.

# Step 3: Mesh

- Step 1: Geometry
  - Step 2: Physics
  - Step 3: Mesh
  - Step 4: Study (pre-processing)
  - Step 5: Results (post-processing)
- Computational work will be done by COMSOL here.

If you don't know the model is good or not, start with coarse mesh first.

COMSOL won't build stuff unless you hit this button.



The most crucial skill in COMSOL is to right-click.

# Step 4: Study

- Step 1: Geometry
- Step 2: Physics
- Step 3: Mesh
- Step 4: Study (pre-processing)  
Computational work will be done by COMSOL here.
- Step 5: Results (post-processing)

**Settings**  
Stationary

**Compute**

Label: Stationary

Study Settings

Tolerance: Physics controlled

Results While Solving

Plot

Plot group: Default

Probes: All

Update at: Steps stored in output

Physics and Variables Selection

Modify model configuration for study step

Node	Solve for	Equation form
Component 1 (comp1)	<input checked="" type="checkbox"/>	
Solid Mechanics (solid)	<input checked="" type="checkbox"/>	Automatic (Stationary)

COMSOL won't compute stuff unless you hit this button.

Sometimes a simulation could take hours or days of computational time.

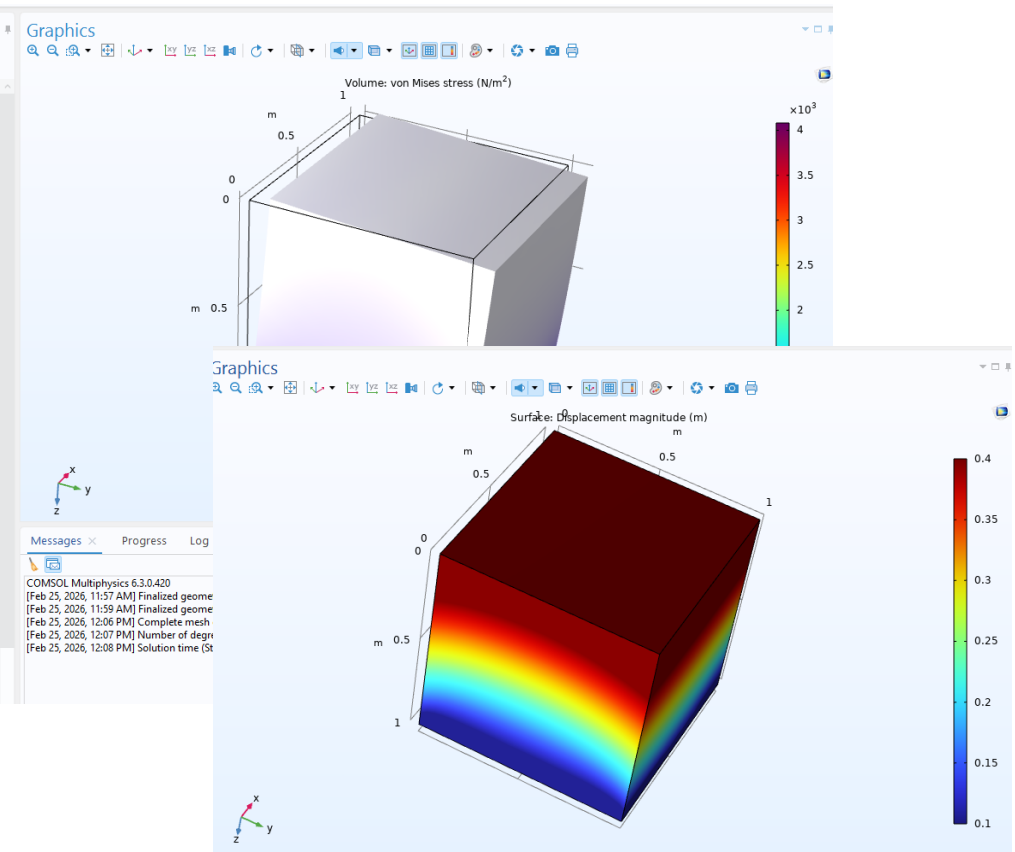
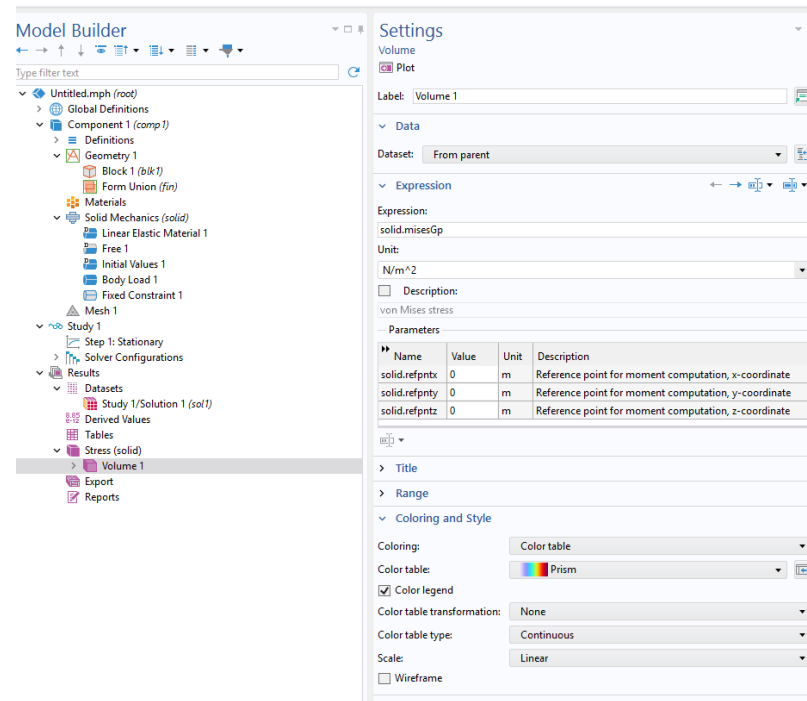
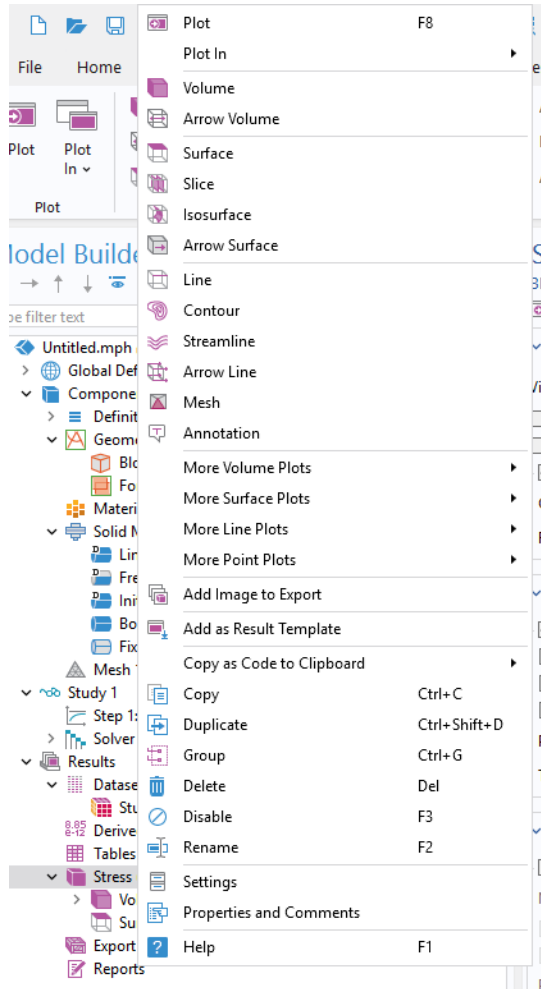
The most crucial skill in COMSOL is to right-click.



COE COLLEGE

# Step 5: Results

- Step 1: Geometry
  - Step 2: Physics
  - Step 3: Mesh
  - Step 4: Study (pre-processing)
  - Step 5: Results (post-processing)
- Computational work will be done by COMSOL here.



Time to right-click and show nice graph, enjoy!

The most crucial skill in COMSOL is to right-click.

