ENR145 Computational Methods:
COMSOL speed run

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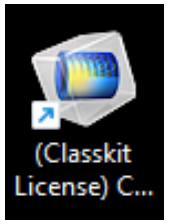
Spring 2026

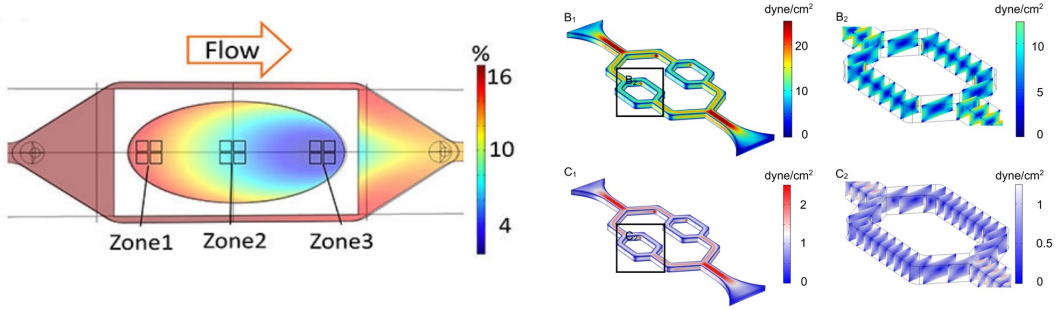
COE COLLEGE

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

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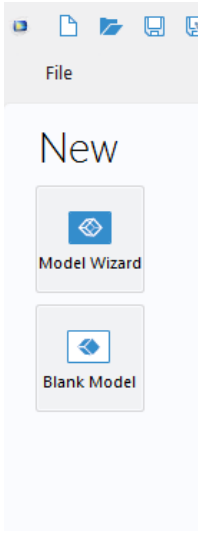
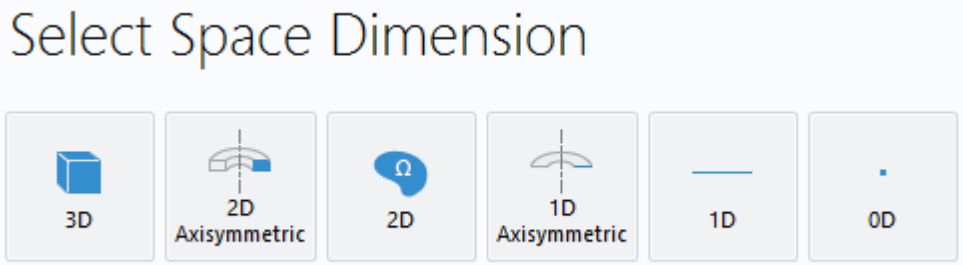
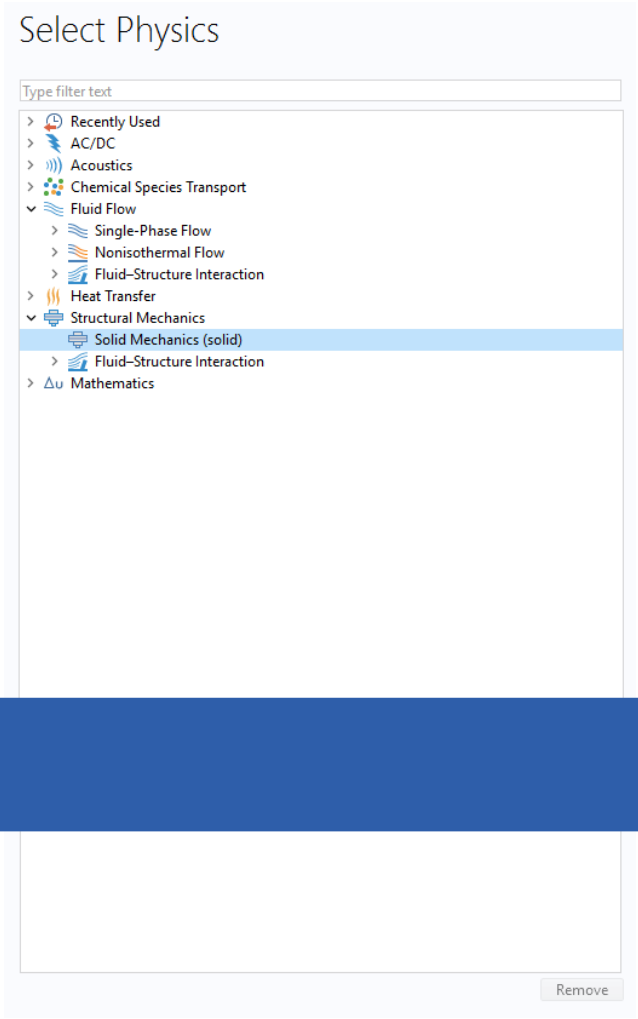
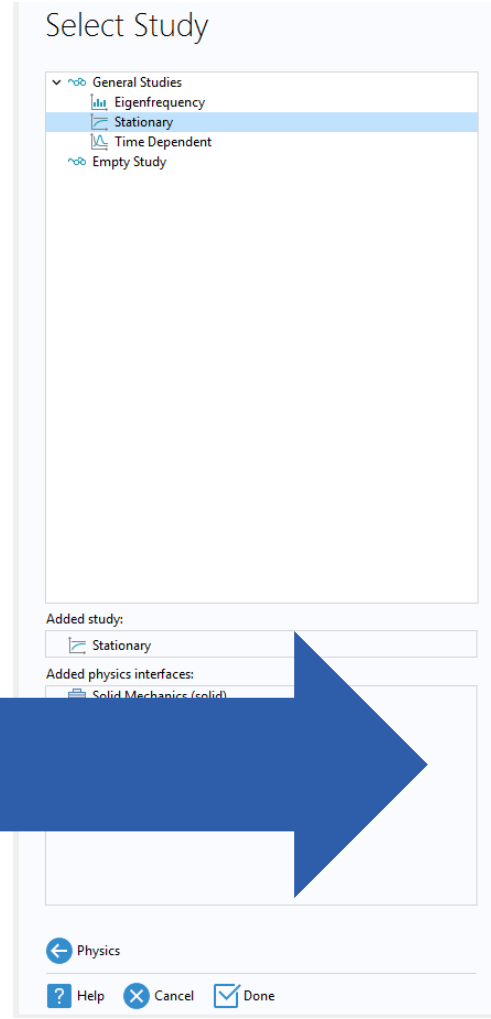
This is how you start a simulation





If your computer is slow, try 2D, 1D or 0D.





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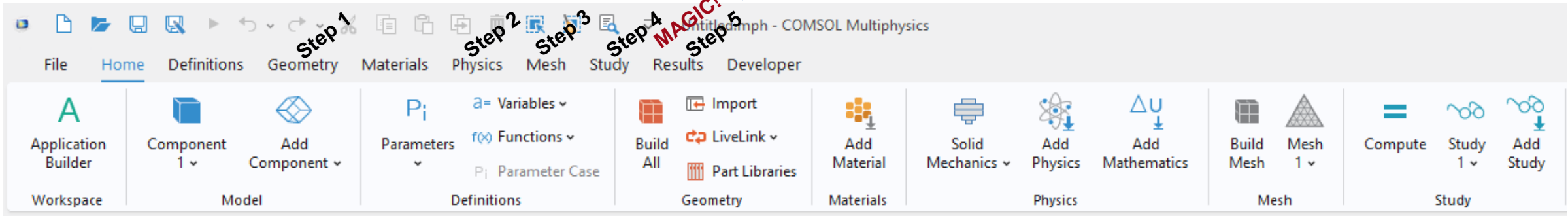
That's how you build a simulation:



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)

COE COLLEGE

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

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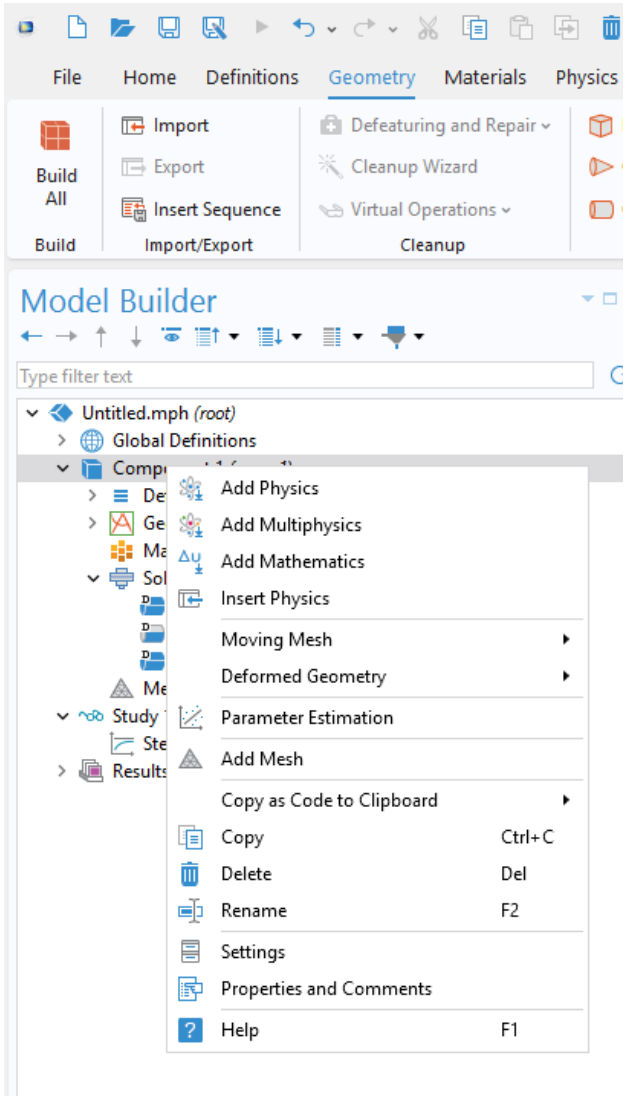

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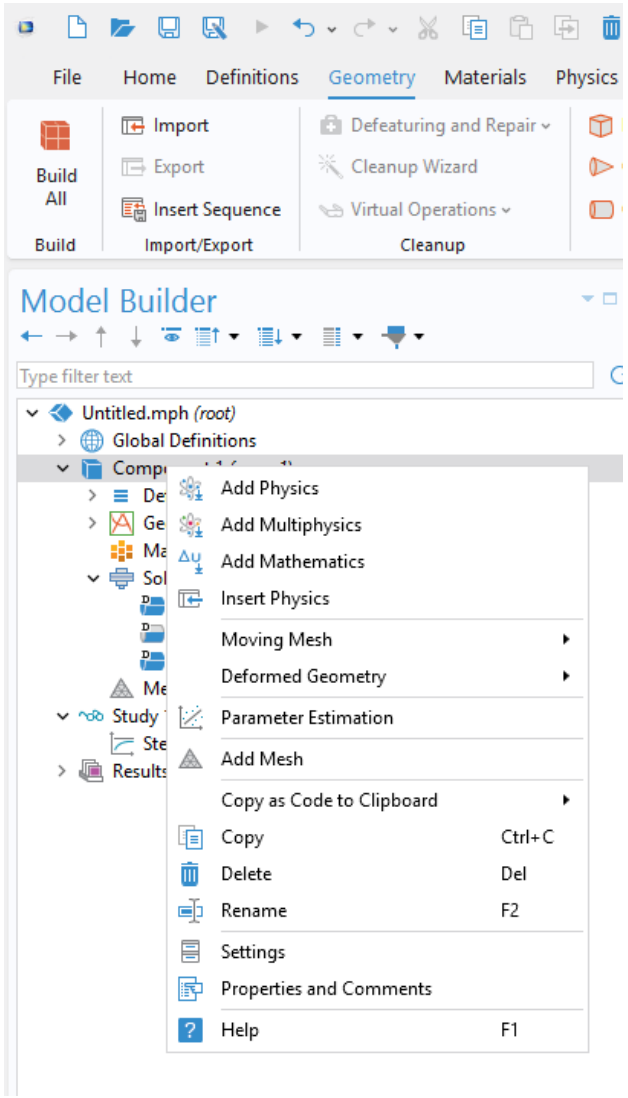

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COE COLLEGE

Step 1: Geometry

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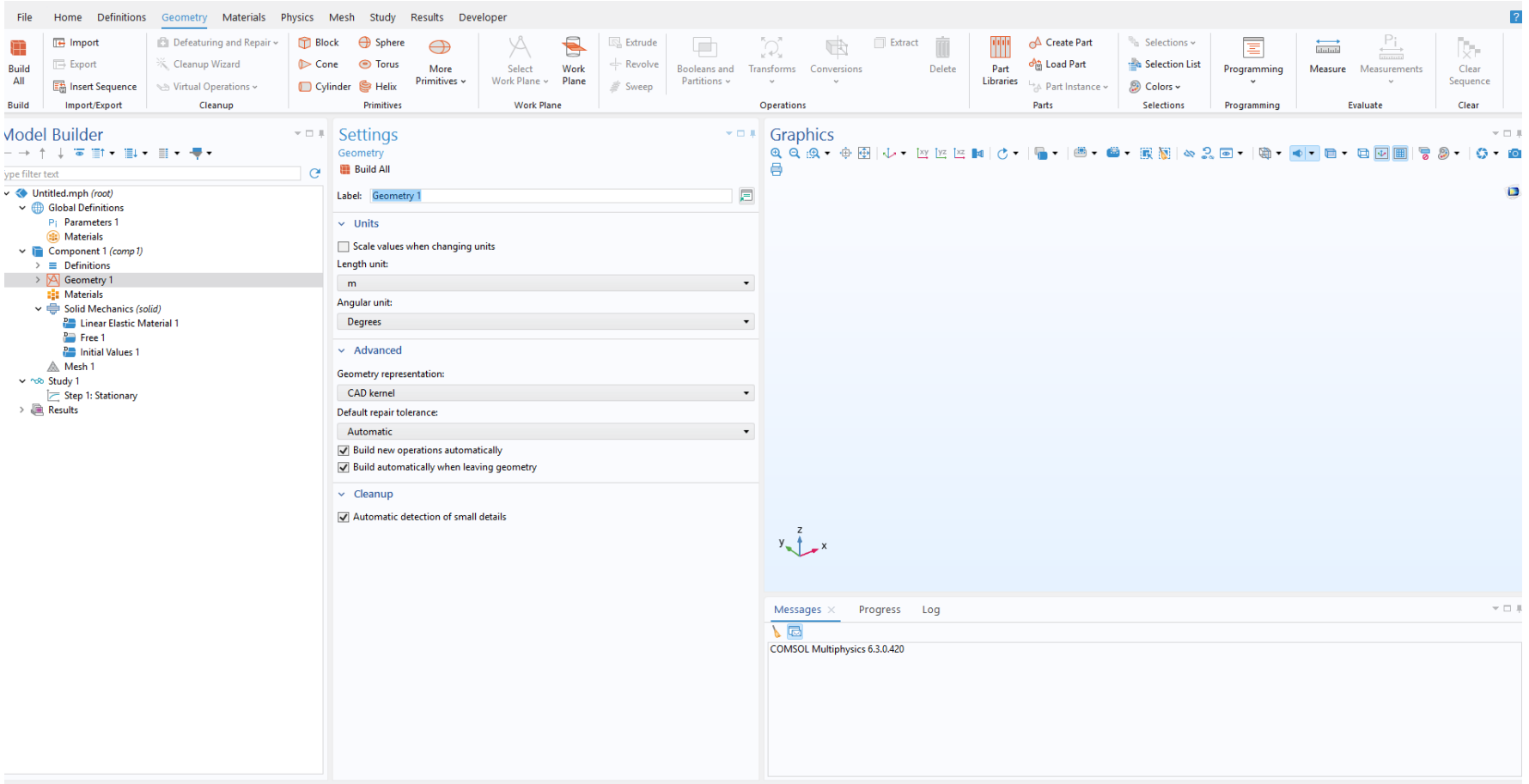
COMSOL's CAD tool sucks. Use anything else other than COMSOL.



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COE COLLEGE

Step 1: Geometry

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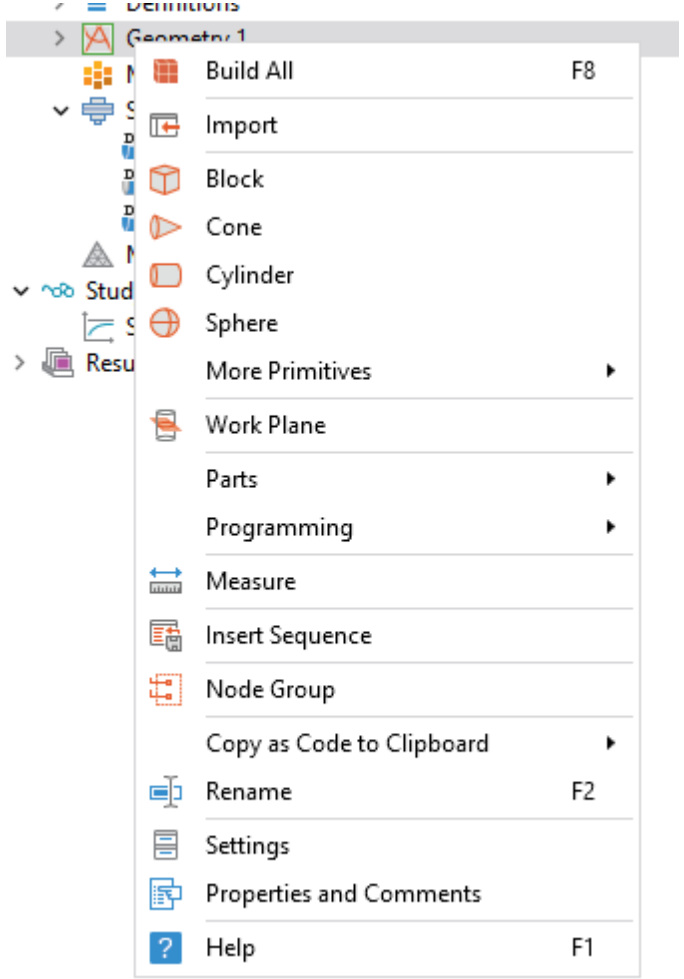
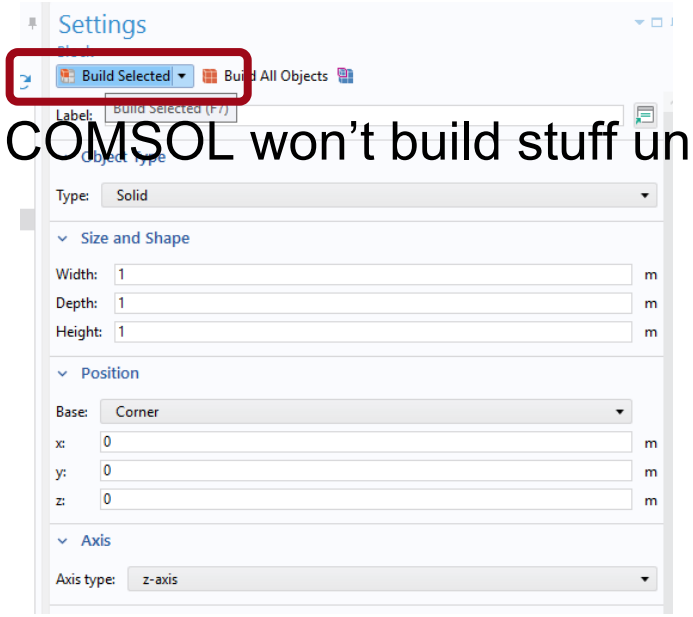
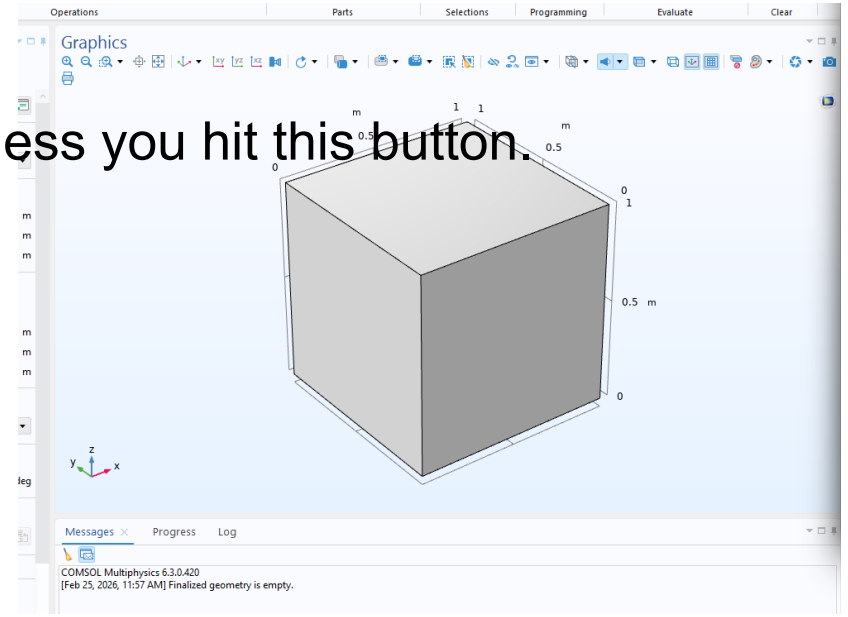


If you have to, right click on geometry and enjoy!



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



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

COE COLLEGE

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.
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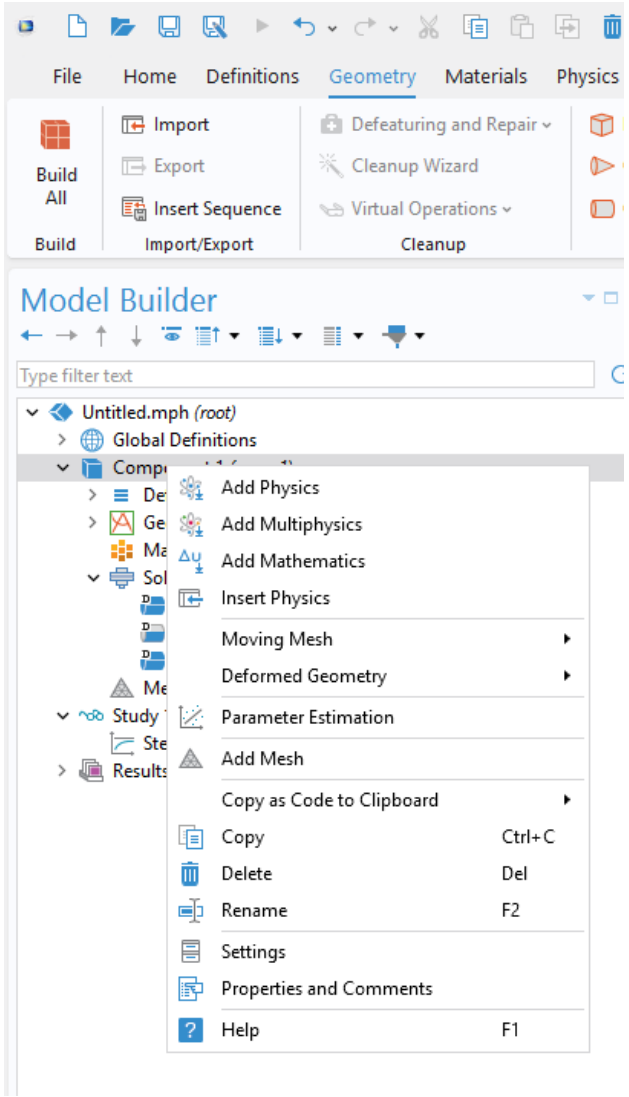


You can right-click and add ANY physics you like.

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

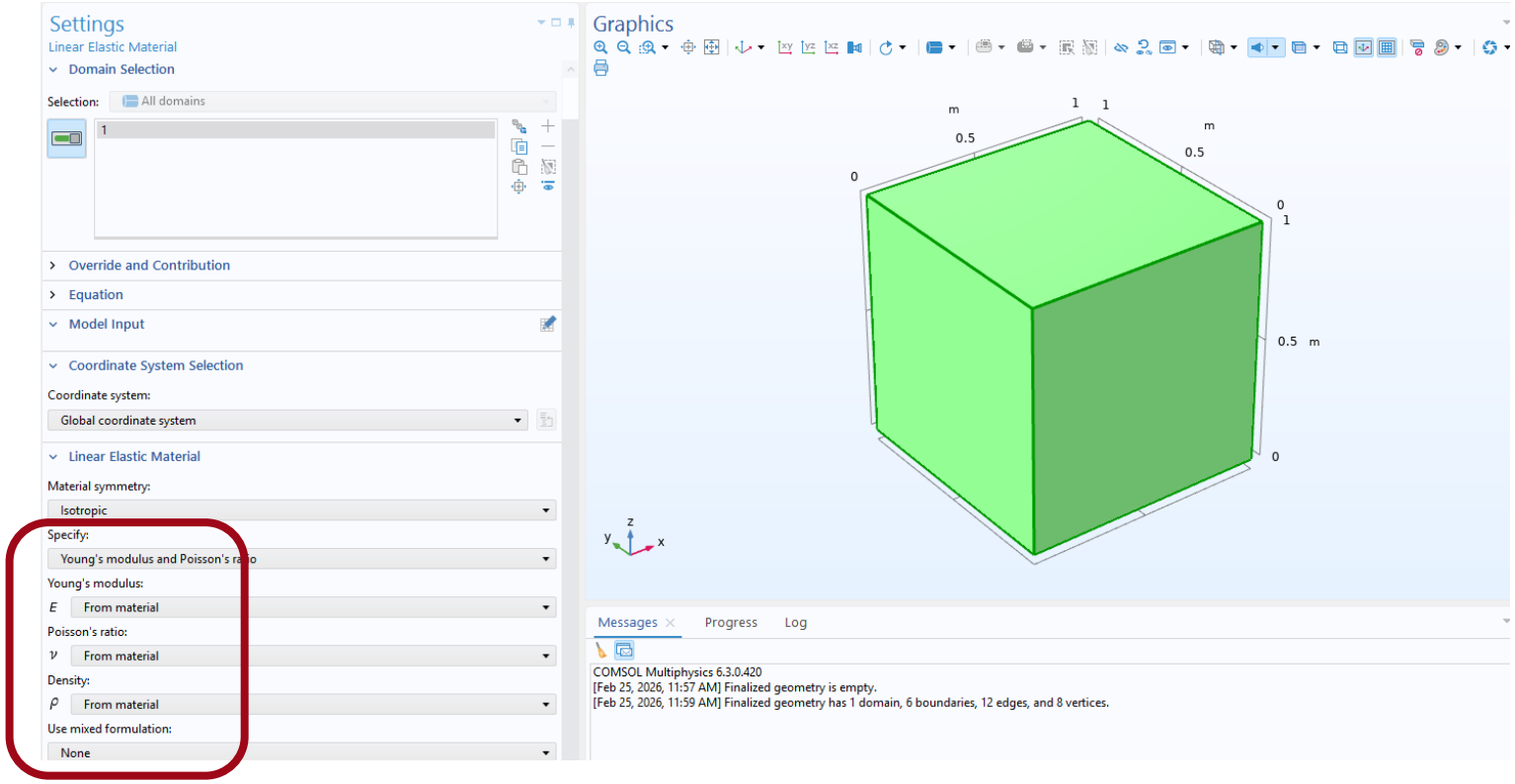
You can link one variable from one physics to another, hence “Multiphysics”.

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

COE COLLEGE

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.

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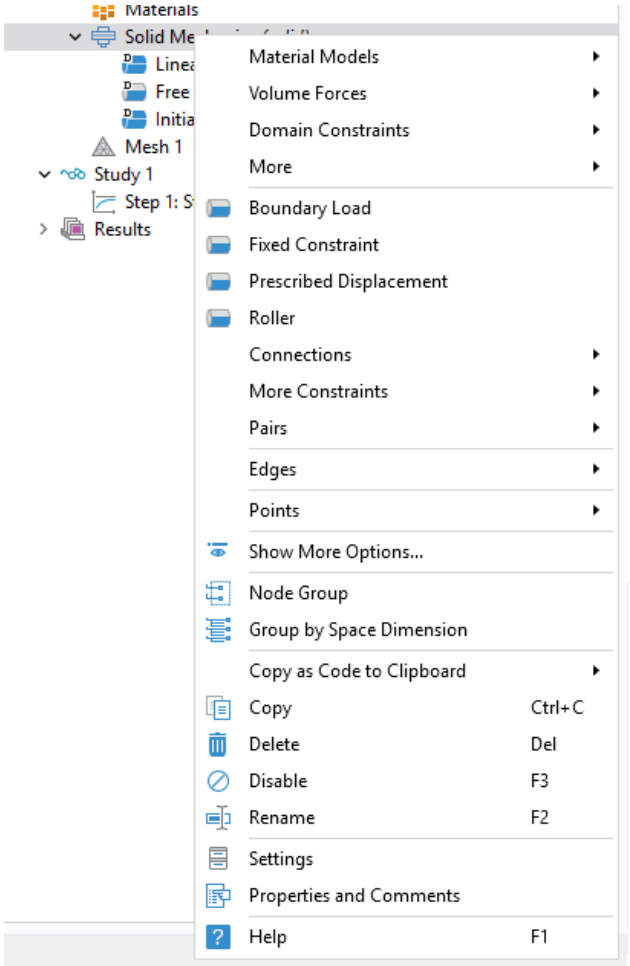
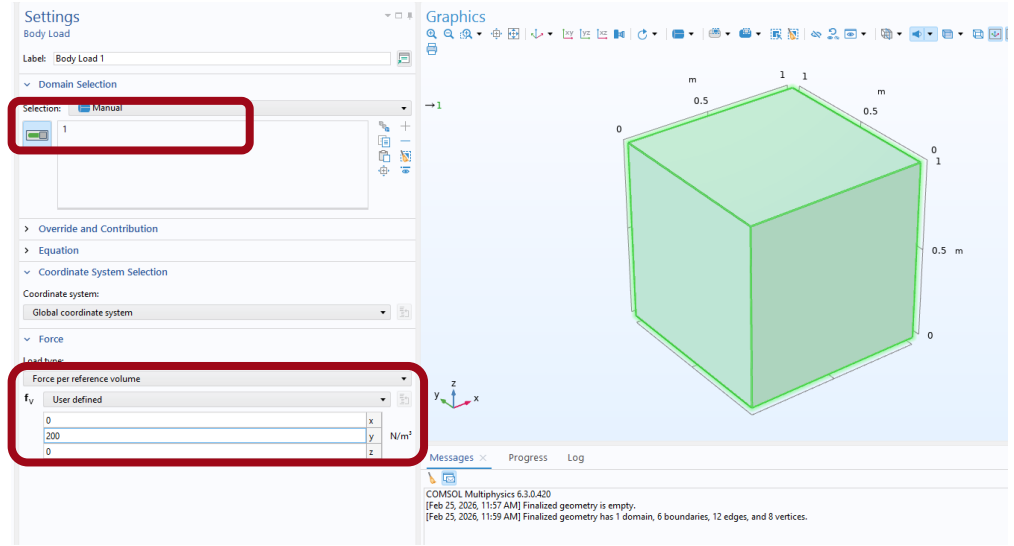
COE COLLEGE

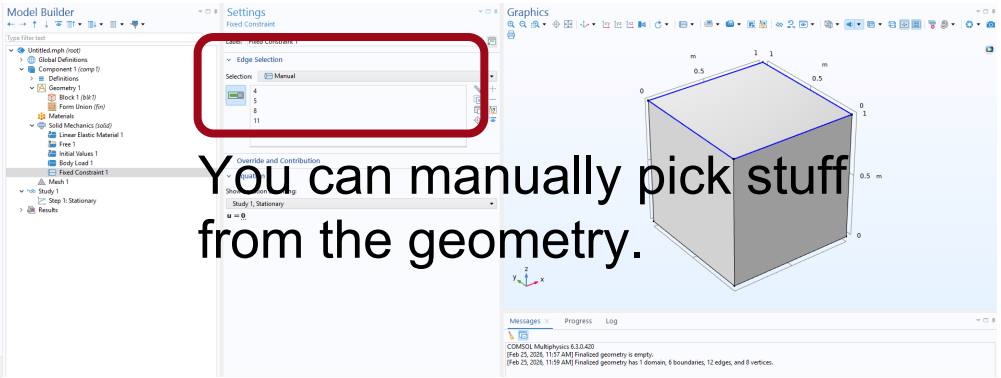
Step 4: Study

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)

Mesh can be generated anytime after geometry.







You can manually pick stuff from the geometry.

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

For structural, we need force and constrains.

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

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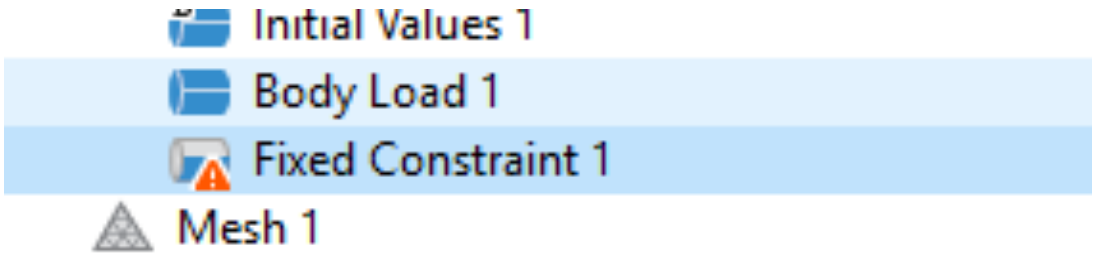
COE COLLEGE

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)



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

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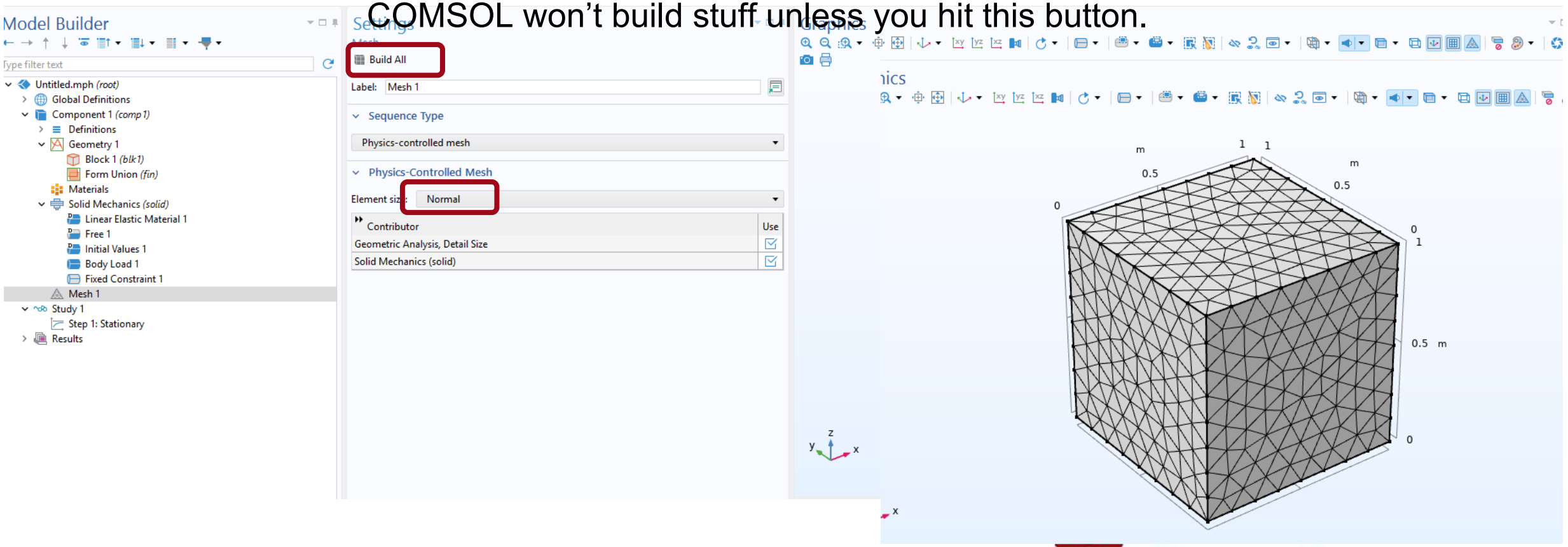
COE COLLEGE

Step 3: Mesh

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)

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.



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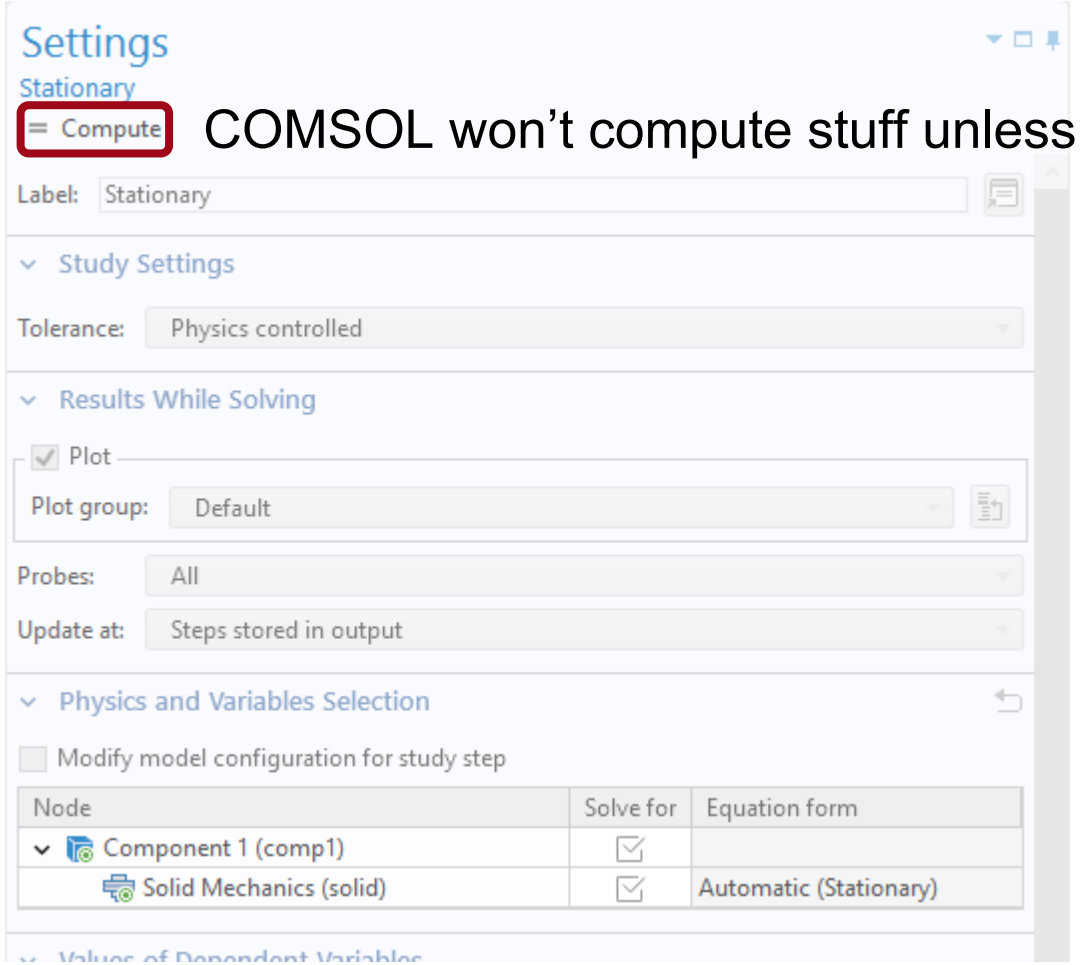
COE COLLEGE

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)



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

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

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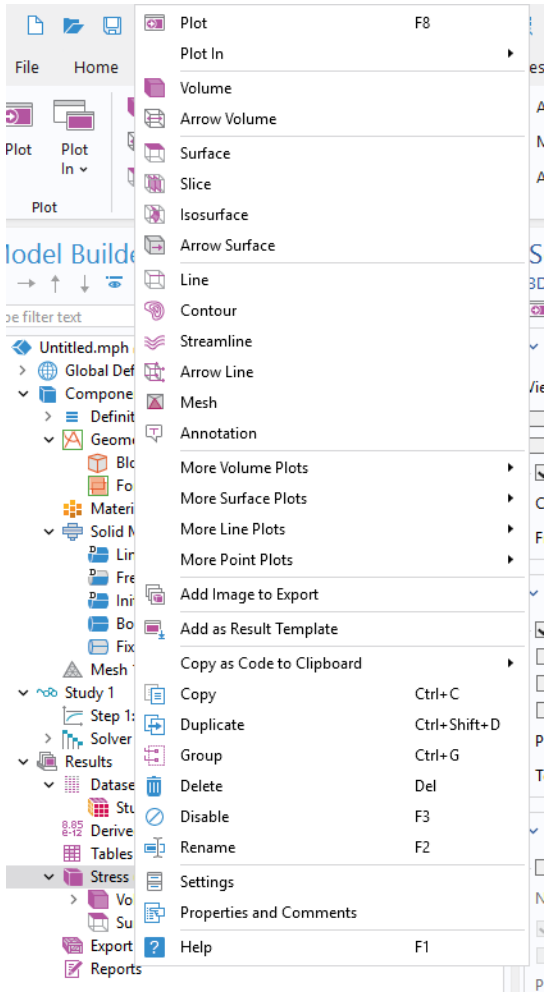
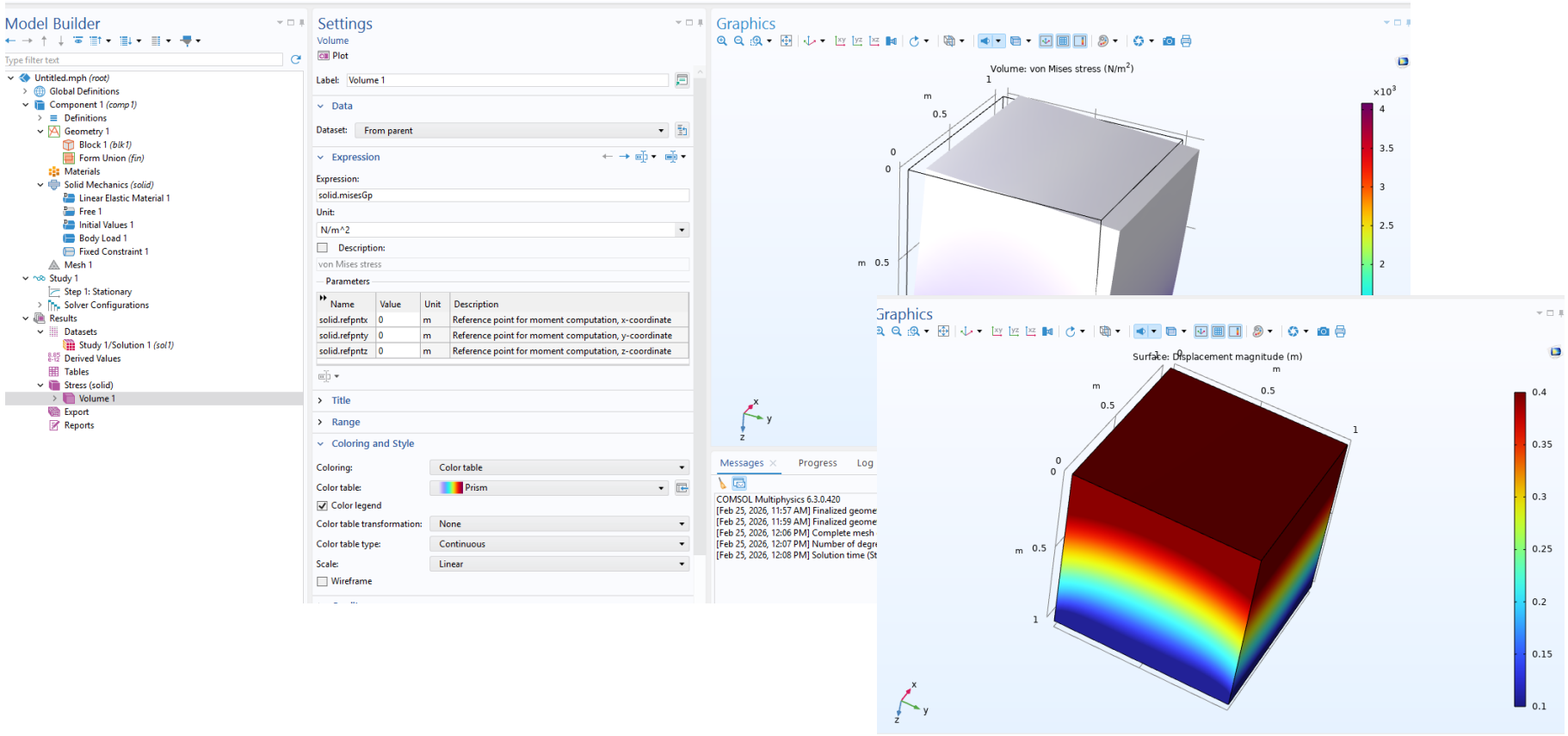
COE COLLEGE

Step 5: Results

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)





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

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