BE 4213/5213: Tissue Biomechanics & Bioengineering
Fall, 2021; University of Texas at Arlington

Project 2
(Due date: 11/12/2021, Wednesday)

Learn from Chapter 1 of Dr. Lee's FEA book and run the Finite Element Analysis of "Pneumatically Actuated PDMS Fingers".

1. **Part I of your project**. You need to follow the direction to build the PDMS finger model and run the simulation, starting from 1.1.1 "Problem Description" to the example on page 20, which asks to apply an upward lifting at the end surface (let us simulate force = 0.5 N and force = 1 N). Stop before the dynamic simulations (Page 21).

2. **Part II of your project**. After you learn how to build a FEA model and perform the simulation using the Chapter 1 example (Part I), let us try to design a better robot PDMS finger to add our innovation. In this design, you will create another row of pneumatical chambers in the other side of the PDMS beam. Note that the chamber size needs to be reconsidered, so you can have two rows of chambers distributing evenly and having a mirror symmetry with respect to the center plan of the PDMS beam. With this design, you can bend the robot finger two directions. If you pressurize the upper pneumatical chambers, the robot finger will bend downwards; if you pressurize the lower pneumatical chambers, the robot finger will bend upwards. What a cool design!

   Now it is up to you to design this robot finger with higher flexibility, build your FEA model, and perform the simulation. You need to simulate both downwards bending and upwards bending.

3. What should be in your project report include detailed descriptions of what you are doing each step, along with screen-prints backup your description, such as set engineering data, using design modeler to build the geometry (with many screen-prints showing you are actually doing it).

4. Submit the hardcopy of your report and upload your final ANSYS project file to CANVAS.

Note:

(i) When installing ANSYS, connect your computer to the school internet using a network cable. If you use wifi, you will see downloading extremely slow and taking >20 hours.

(ii) For students with a Mac computer, no Mac version ANSYS is available. You can use ANSYS installed in the departmental computer (ERB 280). If you need remote access to the departmental computer. Ben will help you to set up the remote access.