MAE 263F: Mechanics of flexible structures and soft robots

Homework 1, Fall 2024

Due: check course website

Submission Instructions:

You should create a single GitHub repository for this class and share it with the instructor (khalidjm@seas.ucla.edu). All the homeworks, reports, presentations, and proposal should be uploaded to this repository. Do not create a separate repository for each assignment. Within your repository, create a separate folder for each assignment (e.g., homework 1, homework 2, homework 3, proposal, midterm report, and final report).

In the first two homeworks for this class, we are essentially rapid-prototyping a software that would be useful for the final project. In this prototyping phase, you can use MATLAB, GNU Octave, Python, etc. However, it is highly recommended that you use C/C++, FORTRAN, Java, etc. for the final project to develop computationally efficient codes.

Assignment:

Chapter 4 of course notes include three deliverables:

1. Simulation of the motion of three connected spheres falling inside viscous fluid (see Section 4.2)
2. Simulation of the motion of N-connected spheres falling inside viscous fluid (see Section 4.3)
3. Simulation of the deformation of elastic beams and comparison with Euler-Bernoulli beam theory (see Section 4.4)

Your submission on BruinLearn should only contain the URL to your GitHub repository. Your GitHub repository should include the following items:

1. A report in .pdf format (file name should be **Homework1_LASTNAME.pdf**; replace LASTNAME by your last name) addressing the questions asked in the deliverables. Include all the plots and figures asked in the above assignments. Make sure to discuss the plots and figures in the report. See the syllabus for formatting requirements. As asked in the syllabus, you must use one of the provided templates.

2. Source code. The submission should have three files named *exactly* as Problem1.[ext], Problem2.[ext], and Problem3.[ext] that implements the three problems; replace [ext] with the appropriate extension based on the programming language of your choice. You may use as many helper functions/files as needed; however, execution of ProblemX.[ext] should run the simulation asked in problem number X.

3. A README file containing instructions on how to run your code.