Research Project

The goal of this research project is to understand the process of connecting the theoretical aspects of continuum mechanics learnt in this course with real-world research problems. To this end, you should choose at least one journal article that utilizes the principles of continuum mechanics to model or elucidate an interesting material behavior. Key insights from this exercise can be presented around following points:

1. Describe your reasoning behind the choice of the research article from a published journal (or a research problem).
2. Summarize the article/problem in less than 200 words.
3. Describe the main assumptions incorporated in the paper that allowed the researchers to appropriately employ the principles of continuum mechanics.
4. Point out *(a)* equilibrium equations, *(b)* elastic constants, *(c)* boundary conditions, and *(d)* constitutive equations in the paper. Also talk about the order in which these tools are used to elucidate the material behavior in question.
5. Discuss in words the stress-strain relationship of the material presented in the paper. What aspects of this behavior set it apart from conventional materials?
6. Discuss which parts of the constitutive behavior discussed in this paper resemble material behaviors covered in class. Also, discuss the newly introduced aspects of the material behavior that you find interesting.
7. Provide a concluding commentary on how the principles of continuum mechanics improve your understanding of this paper.
8. Point out some key differences in the overall notation used in the paper versus what we have used in class.
9. Rewrite the equilibrium equation(s) and the constitutive equation(s) of this paper in your notation.

Part I: An oral presentation (10-15 min) that roughly covers the topics listed above. *To be held in class during the last week of classes (exact schedule TBD).* [**5 points**]

Part II: A term paper organized around the questions indicated above. *Submit (on Canvas) a single PDF combining your paper and any supplementary documents (journal articles) by* ***noon on Dec 16***.

[**5 points**]

Notes:

- *As such there is no page limit, but the suggested length of the document is 3 pages (single-line spacing, at least 11 font size).*
- *The equations can be handwritten and appended in the end. Be sure to number the equations and refer to them correctly in the main text.*