Lecture 17 - Localization

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schedule

- Apr 8 - Localization, Homework 5 Due
- Project Work Days
- Apr 15 - Homework 6 Due
- Apr 22 - Homework 7 Due

localization

swiftcomp files

- As a reminder: you can access files generated in SwiftComp by mapping a network drive
- In Windows, right click “My Computer” click “Map Network Drive” and under “Folder” type https://cdmhub.org/webdav
- Login with other credentials and enter your cdmhub user name and password

localization

- There are some advantages to homogenization with specialized micromechanics tools, but mean field is usually good enough and more efficient
- The real advantage to specialized micromechanics software is the ability to localize
- In the homogenization step, we apply idealized loads to build an effective stiffness matrix
- In the localization step, we apply real loads to the large-scale structure and then extract local stresses

swiftcomp

- To perform localization in SwiftComp, we first mesh the microstructure and perform homogenization
- Now we use the homogenized stiffness as a custom, anisotropic material in any finite element package
- We run a finite element analysis and extract displacements, rotations, and strains at some element of interest

swiftcomp

- In SwiftComp, v_1, v_2, v_3 refer to the macro displacements
- C_{ijkl} is a matrix representation of the macro rotations
- e_{11} etc. represent the strains
- In COMSOL, displacements are output with u, v, and w
- Rotations are given by solid.RotxX, solid.RotxY, etc.
- And strains were found in a previous homework, solid.el11, solid.el22, etc.

swiftcomp

- When meeting live, I use this time to demonstrate localization in SwiftComp
- ("dehomogenization") in their lingo
- As an alternative, you can follow this[1] video

[1] https://www.youtube.com/watch?v=ELFGK9FF64M