redAnTS 1 - Numerical Results

Author: Rajesh Bhaskaran, Cornell University

Problem Specification
1. Pre-Analysis & Start-Up
2. Geometry
3. Mesh
4. Physics Setup
5. Numerical Solution
6. Numerical Results
7. Verification & Validation
Comments

Numerical Results

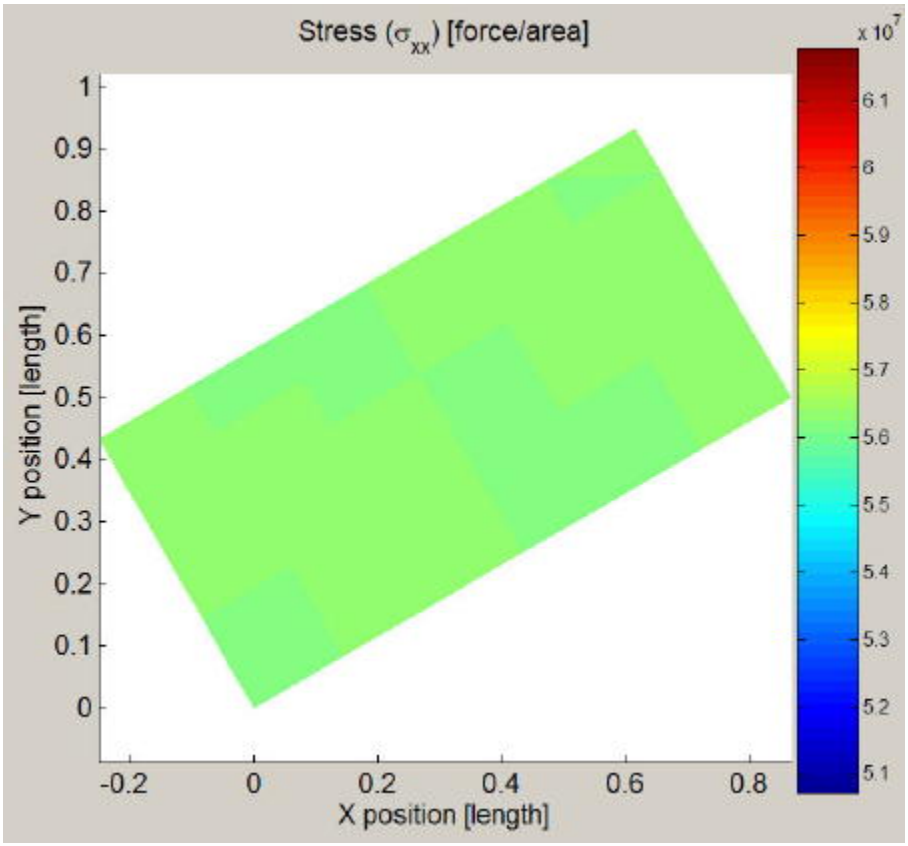
Note that you'll need to complete the code in the following post-processing modules in the *PostProcessMenuFiles* folder before you can plot the stress and strain:

- CalcStrainStress.m
- CalcPrincipals.m
- CalcEffectiveStress.m

Before we dive into this step with full gusto, note that the ***Post-Processing*** field under our trusty pal ***Current Settings*** is empty. This signifies that the program is yet to calculate stress and strain from the nodal displacements. To calculate the stress and strain components, click on ***Strain***, ***Stress*** under ***Post-Process***. Voila, the program reports ***Stress/Strain*** done in ***Current Settings***.

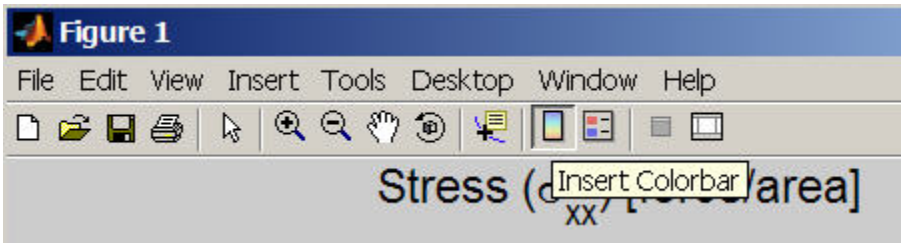
Plot $_{xx}$

In the ***Plotting*** menu, select ***Stress (xx)***.



We get a homogeneous state of stress as expected.

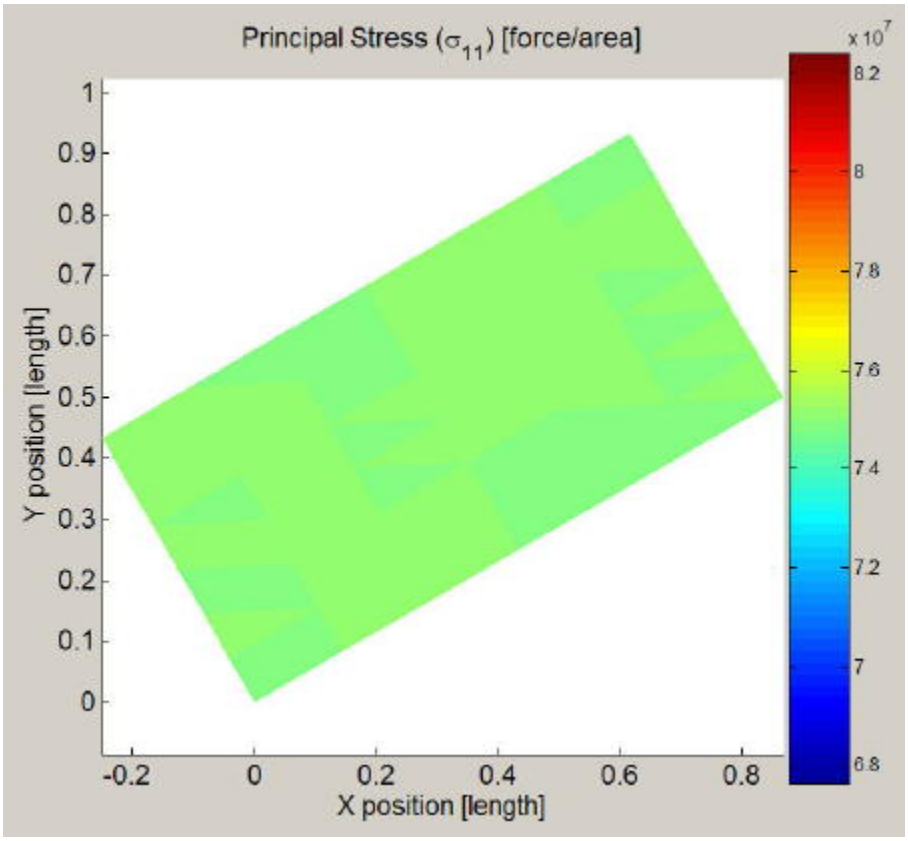
To save a copy of the plot, click on ***Plot*** in the ***Export*** menu. Save the plot as `sigma_xx.fig`. To convert the plot to the *jpeg* format, open *sigma_xx.fig* in MATLAB: at the MATLAB prompt, type `open('sigma_xx.fig')`. A MATLAB quirk is that the colorbar is not automatically displayed in this window. (Without the colorbar, the reader cannot determine the stress levels corresponding to the various colors.) To add the colorbar to the plot, click on the *Insert Colorbar* button in the toolbar at the top (see snapshot below).



In the figure window, select ***File*** -> ***Save as***. Under ***Save as type***, select ***JPEG image*** and click ***Save***. Open the jpeg image from your working folder to verify that it has been created properly.

Plot $_{11}$

To plot the principal stress $_{11}$, select ***Stress (11)*** i n the ***Plotting*** menu. You'll get an error saying "Reference to non-existent field 'principals'". This is because we have not yet calculated the principal stresses from the stress components. Go to the ***Post-Process*** menu and select ***Principals***. You'll see the message Principals done. Try plotting ***Stress (11)*** now.



We again get a homogeneous state of stress as expected. From the colorbar, the stress value is around 75 MPa which matches the applies normal traction. Click on ***Plot*** in the ***Export*** menu and save the plot as `sigma_11.fig`.

Export Data

To save all the data in the workspace, select ***Workspace*** in the ***Export*** menu. Specify `rect.mat` as the filename and click ***OK***.

To see the information available in the help page for the ***Plotting*** menu, click on ***Help*** for this menu and scan through it. Click ***OK***.

Now that we have our post processing results, we can continue to Step 7, where we will verify your results.

Go to Step 7: Verification and Validation

Go to all MATLAB Learning Modules