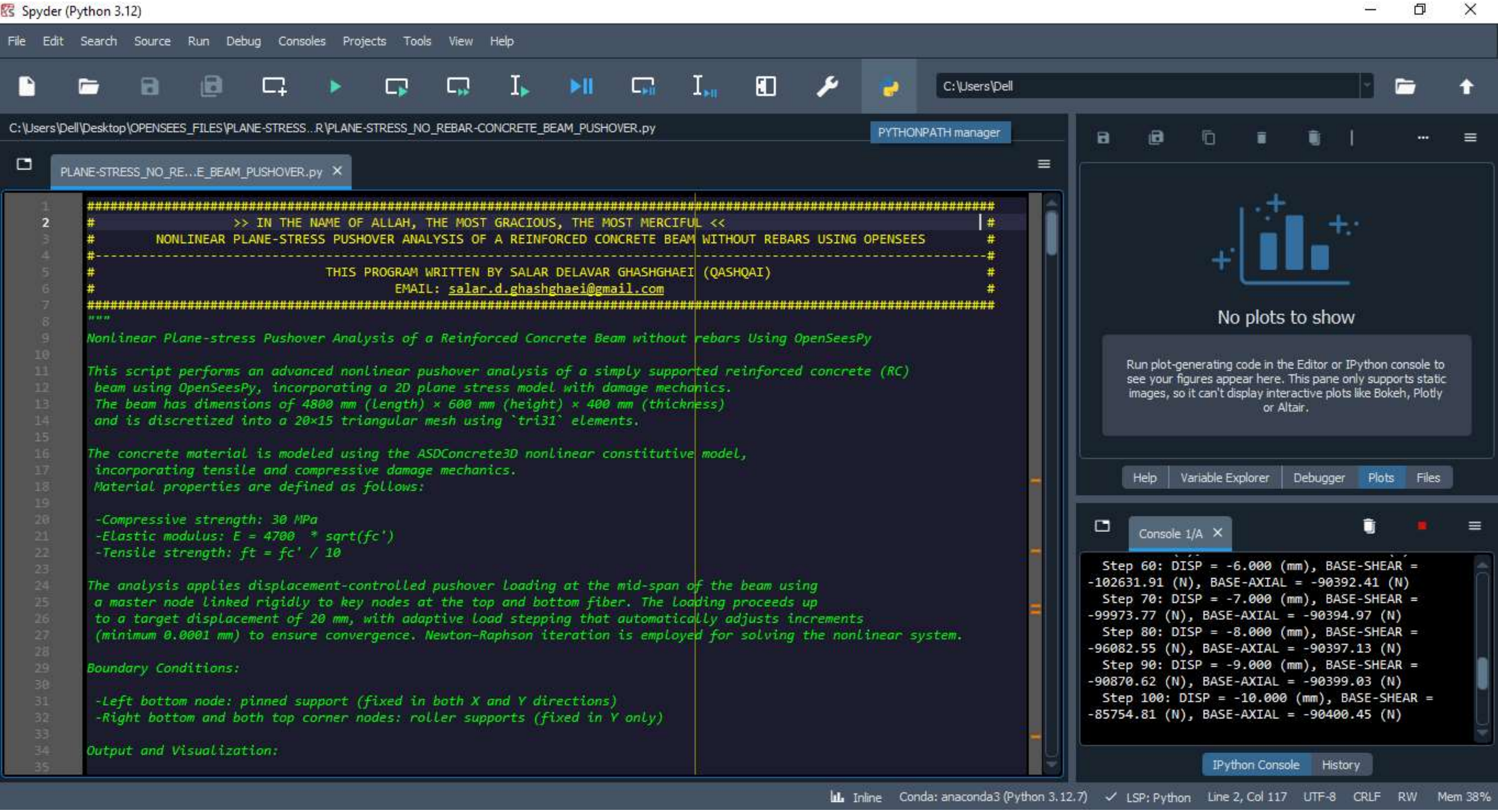
>> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL <<

MOMENT-CURVATURE ANALYSIS OF CONFINED CONCRETE SECTION IN UNCERTAINITY CONDITIONS MONTE-CARLO METHOD

WRITTEN BY SALAR DELAVAR GHASHGHAEI (QASHQAI)


Spyder (Python 3.12)
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C:\Users\Dell\Desktop\OPENSEES_FILES\PLANE-STRESS...R\PLANE-STRESS_NO_REBAR-CONCRETE_BEAM_PUSHOVER.py
PYTHONPATH manager
PLANE-STRESS_NO_RE...E_BEAM_PUSHOVER.py
>> IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL <<
NONLINEAR PLANE-STRESS PUSHOVER ANALYSIS OF A REINFORCED CONCRETE BEAM WITHOUT REBARS USING OPENSEES
THIS PROGRAM WRITTEN BY SALAR DELAVAR GHASHGHAEI (QASHQAI)
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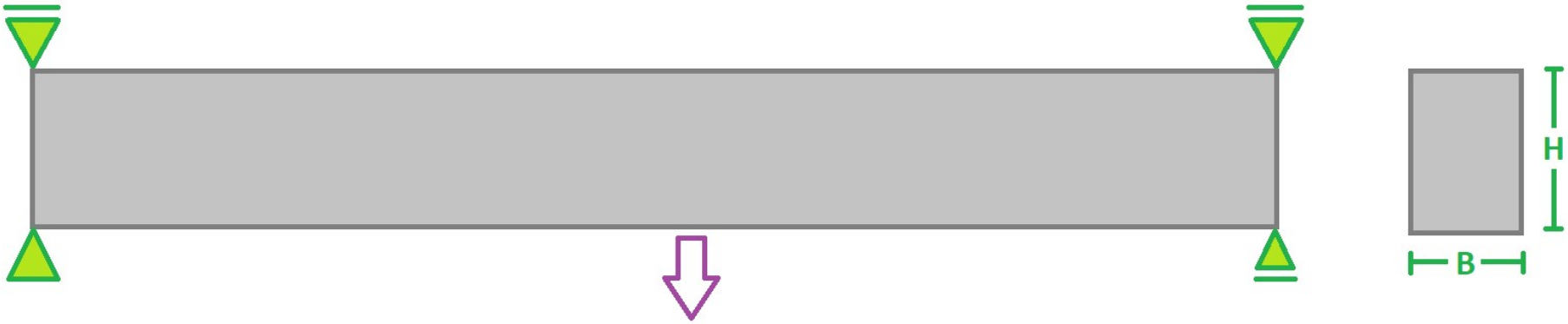
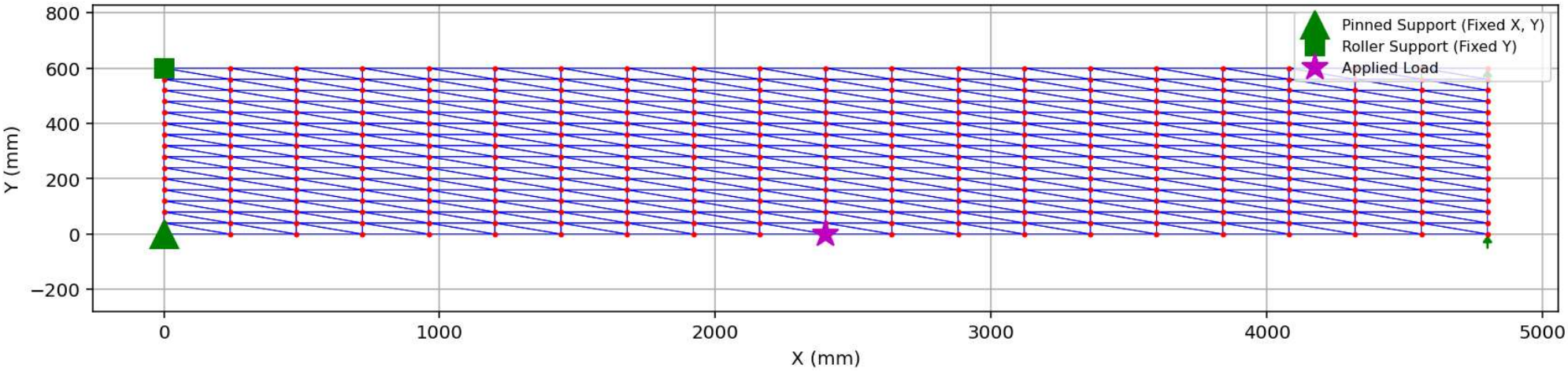
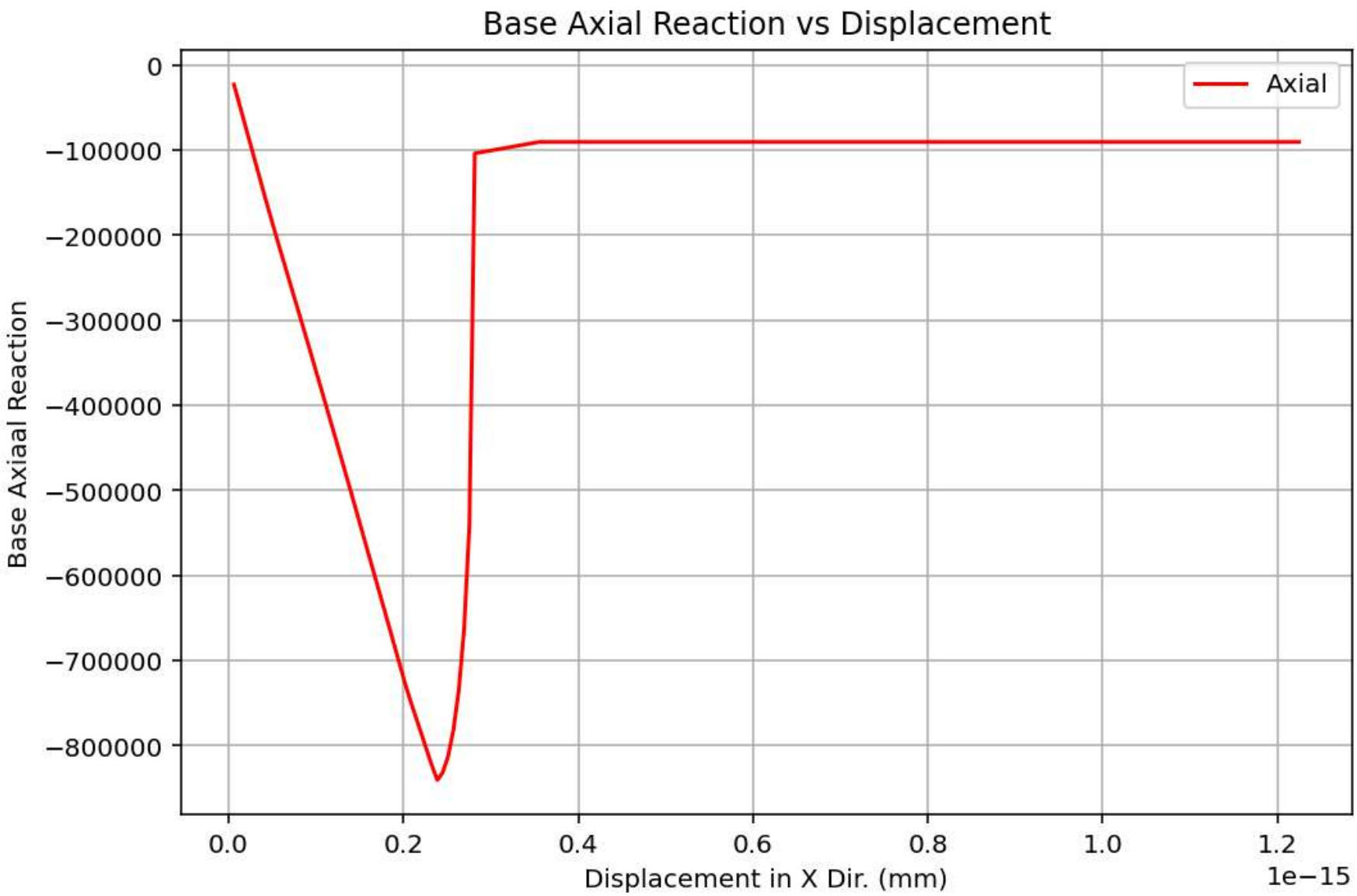
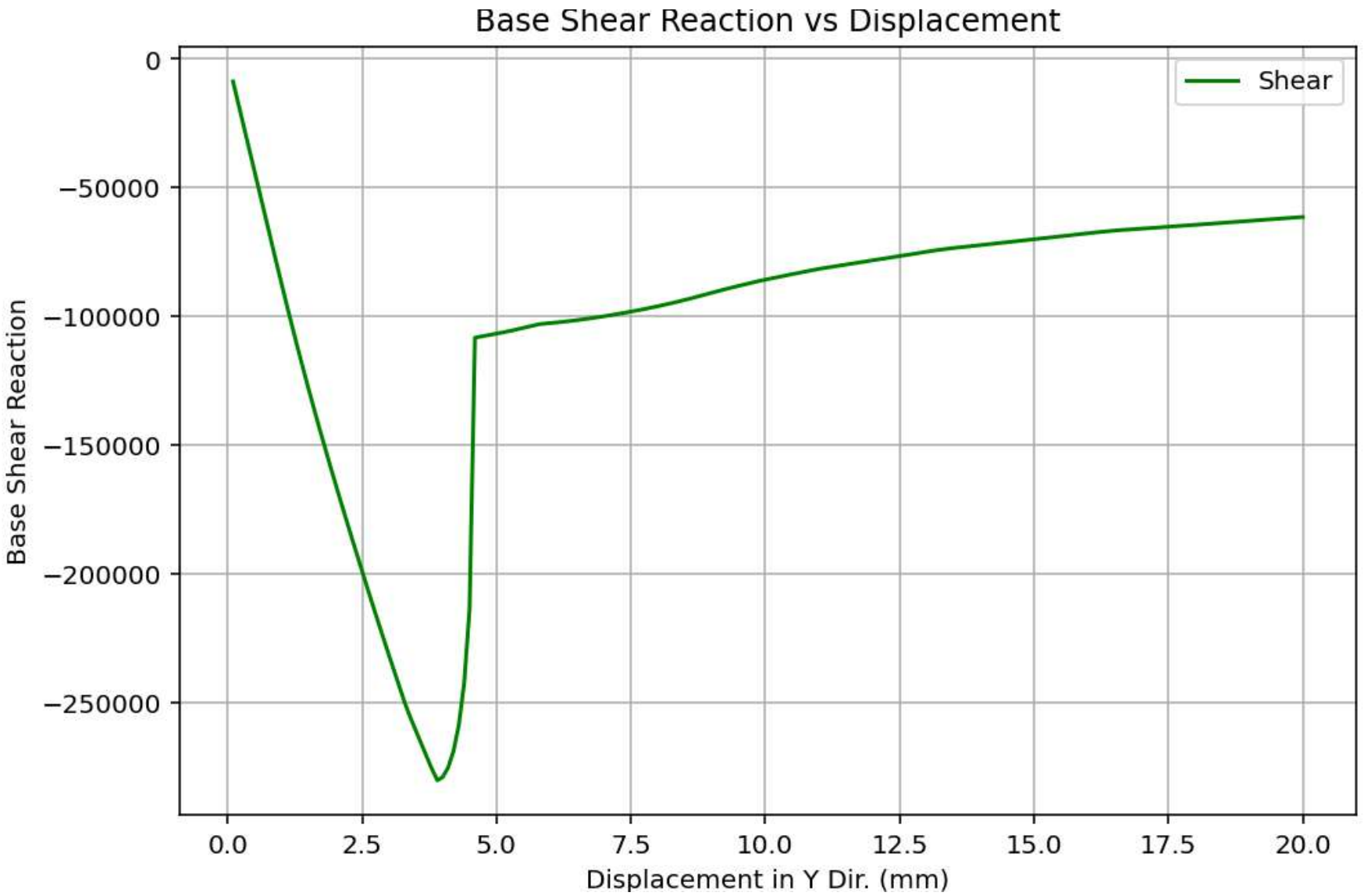
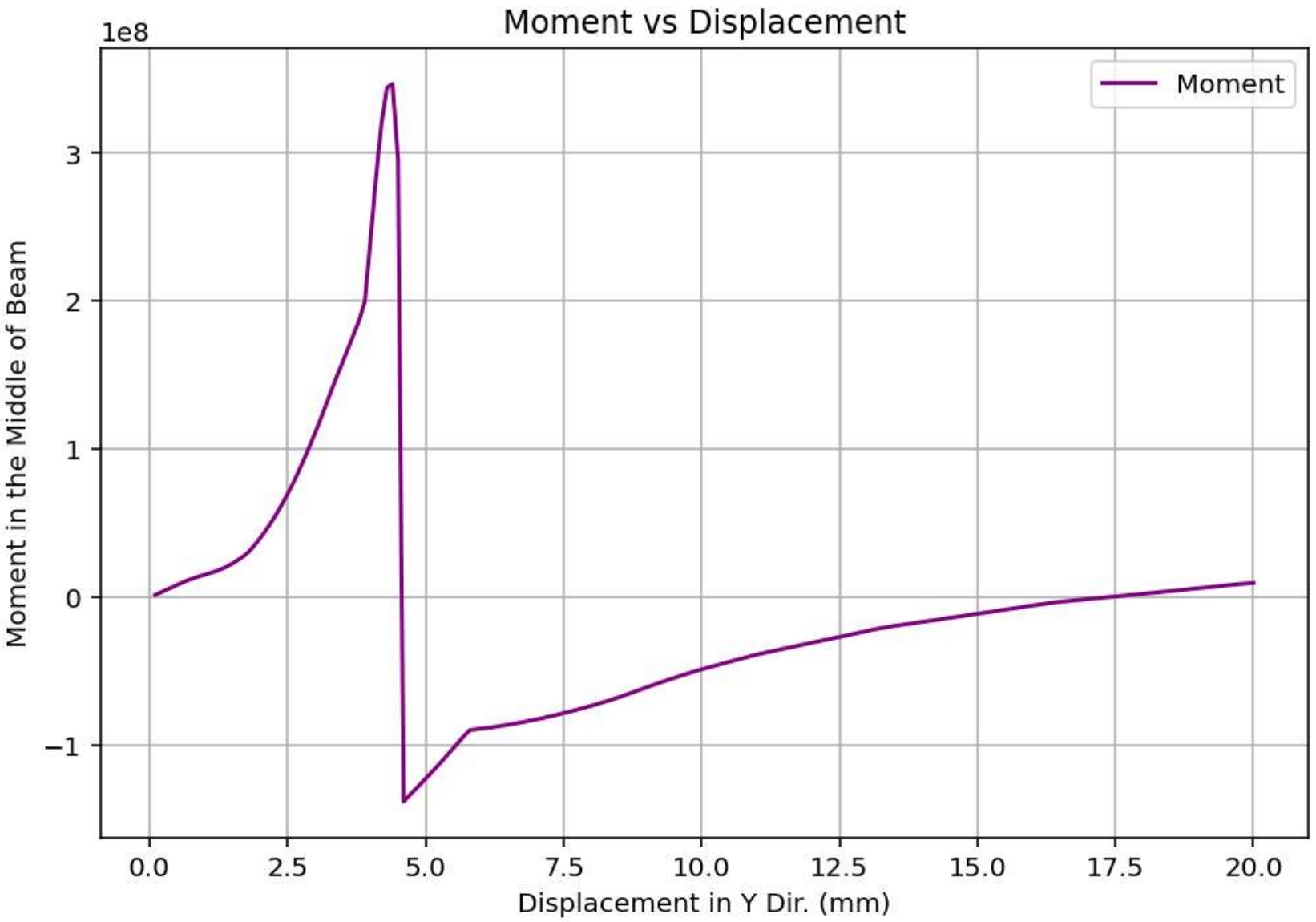
"""
Nonlinear Plane-stress Pushover Analysis of a Reinforced Concrete Beam without rebars Using OpenSeesPy
This script performs an advanced nonlinear pushover analysis of a simply supported reinforced concrete (RC)
beam using OpenSeesPy, incorporating a 2D plane stress model with damage mechanics.
The beam has dimensions of 4800 mm (length) × 600 mm (height) × 400 mm (thickness)
and is discretized into a 20×15 triangular mesh using `tri31` elements.
The concrete material is modeled using the ASDConcrete3D nonlinear constitutive model,
incorporating tensile and compressive damage mechanics.
Material properties are defined as follows:
-Compressive strength: 30 MPa
-Elastic modulus: E = 4700 * sqrt(fc')
-Tensile strength: ft = fc' / 10
The analysis applies displacement-controlled pushover loading at the mid-span of the beam using
a master node linked rigidly to key nodes at the top and bottom fiber. The loading proceeds up
to a target displacement of 20 mm, with adaptive load stepping that automatically adjusts increments
(minimum 0.0001 mm) to ensure convergence. Newton-Raphson iteration is employed for solving the nonlinear system.
Boundary Conditions:
-Left bottom node: pinned support (fixed in both X and Y directions)
-Right bottom and both top corner nodes: roller supports (fixed in Y only)
Output and Visualization:
No plots to show
Run plot-generating code in the Editor or IPython console to see your figures appear here. This pane only supports static images, so it can't display interactive plots like Bokeh, Plotly or Altair.
Help Variable Explorer Debugger Plots Files
Console 1/A
Step 60: DISP = -6.000 (mm), BASE-SHEAR = -102631.91 (N), BASE-AXIAL = -90392.41 (N)
Step 70: DISP = -7.000 (mm), BASE-SHEAR = -99973.77 (N), BASE-AXIAL = -90394.97 (N)
Step 80: DISP = -8.000 (mm), BASE-SHEAR = -96082.55 (N), BASE-AXIAL = -90397.13 (N)
Step 90: DISP = -9.000 (mm), BASE-SHEAR = -90870.62 (N), BASE-AXIAL = -90399.03 (N)
Step 100: DISP = -10.000 (mm), BASE-SHEAR = -85754.81 (N), BASE-AXIAL = -90400.45 (N)
IPython Console History
Inline Conda: anaconda3 (Python 3.12.7) LSP: Python Line 2, Col 117 UTF-8 CRLF RW Mem 38%

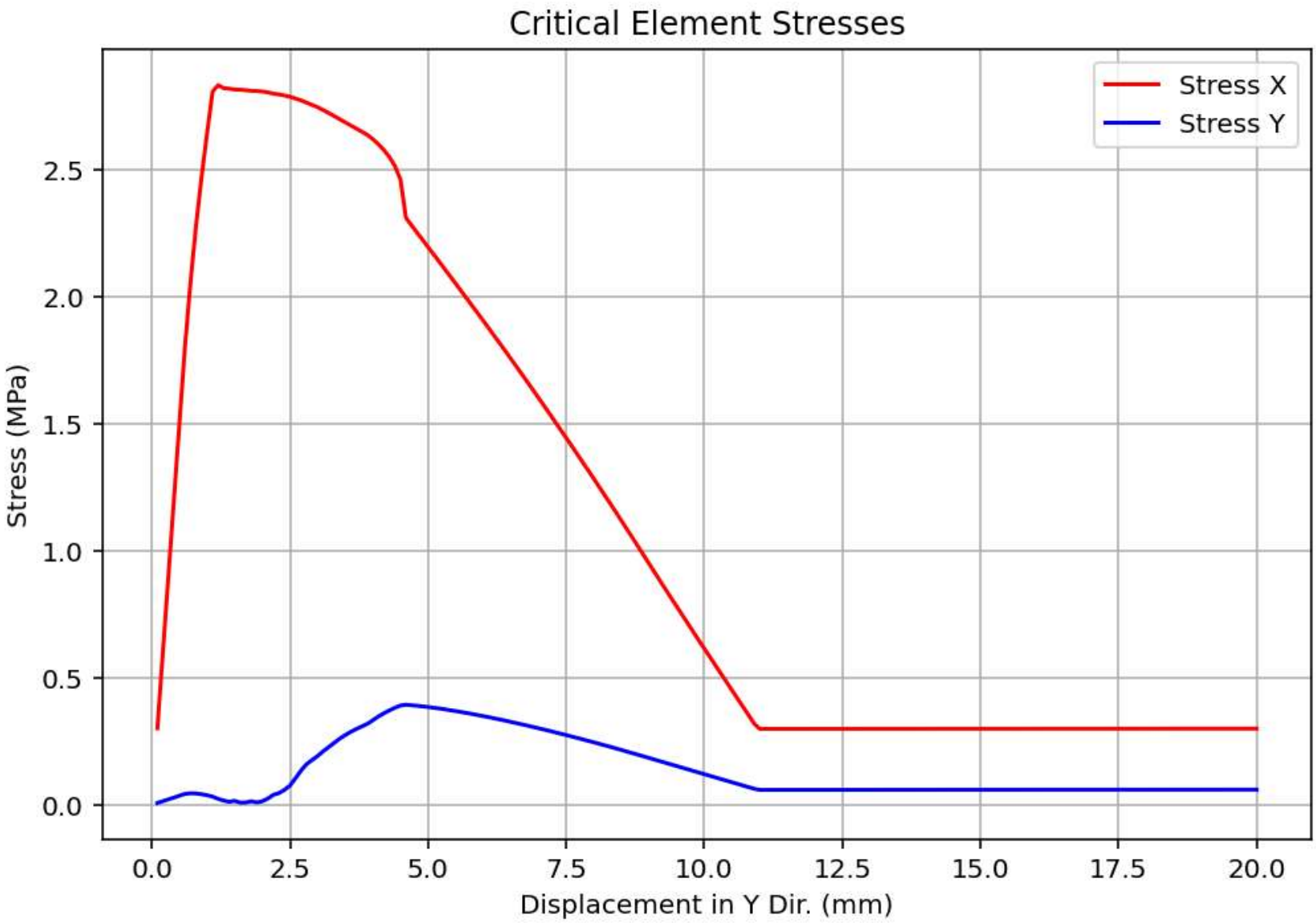

H
B
INCREMENTAL
DISPLACEMENT


Pinned Support (Fixed X, Y)
Roller Support (Fixed Y)
Applied Load
Y (mm)
X (mm)
800
600
400
200
0
−200
0
1000
2000
3000
4000
5000


Base Axial Reaction vs Displacement
Axial
0
−100000
−200000
−300000
−400000
−500000
−600000
−700000
−800000
Base Axiaal Reaction
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−15
Displacement in X Dir. (mm)


Base Shear Reaction vs Displacement
Shear
Base Shear Reaction
0
−50000
−100000
−150000
−200000
−250000
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Displacement in Y Dir. (mm)


Moment vs Displacement
1e8
Moment
3
2
1
0
−1
Moment in the Middle of Beam
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Displacement in Y Dir. (mm)


Critical Element Stresses
Stress X
Stress Y
Stress (MPa)
0.0
0.5
1.0
1.5
2.0
2.5
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Displacement in Y Dir. (mm)