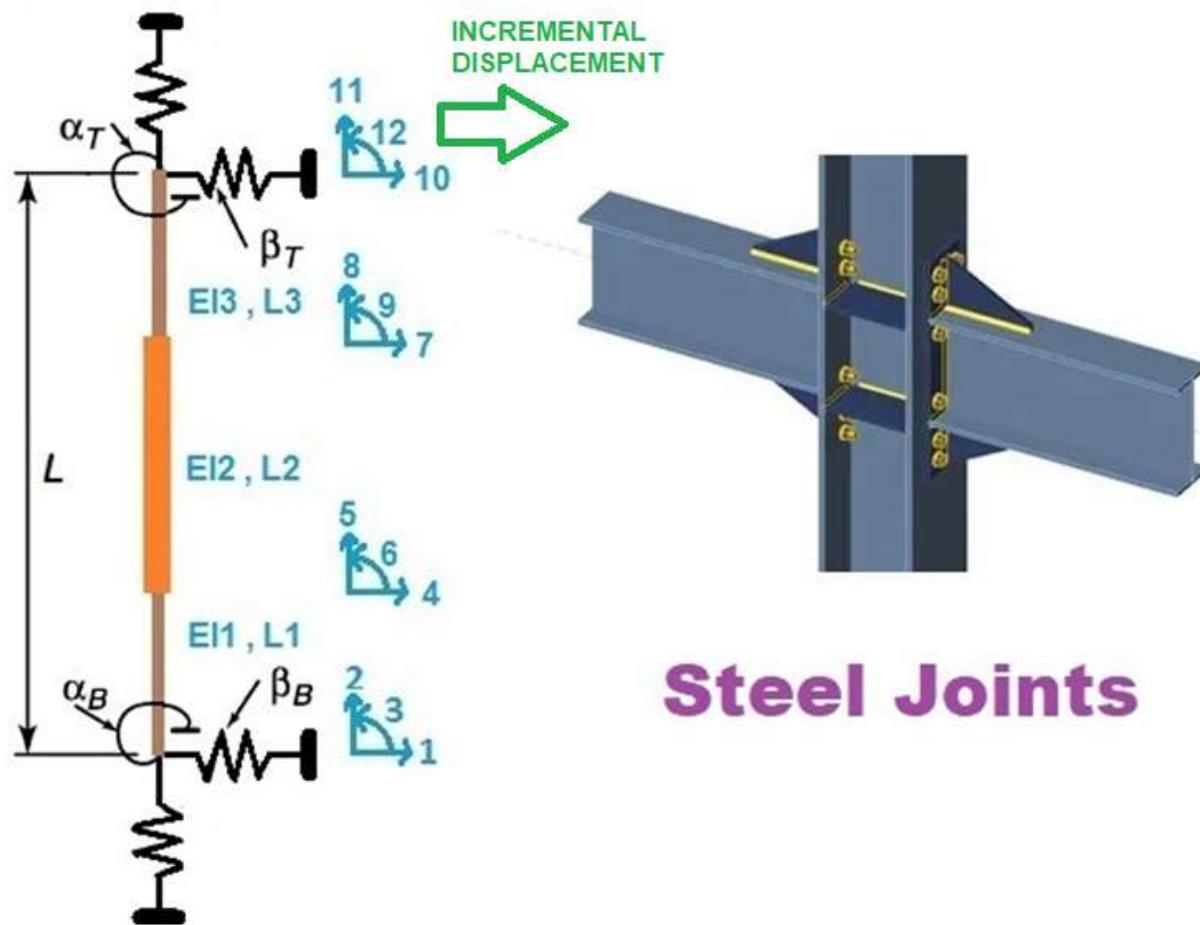


IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

PUSHOVER ANALYSIS OF STEEL COLUMNS WITH AXIAL AND ROTATIONAL SPRINGS FOR MODELING BEAM COLUMN JOINTS

WRITTEN BY SALAR DELAVAR GHASHGHAEI (QASHQAI)



Spyder (Python 3.12)

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C:\Users\Dell\Desktop\OPENSEES_FILES\CONCRETE_COLUMN_JOINTS_CONTACT\STEEL_COLUMN_JOINTS.py

STEEL_COLUMN_JOINTS.py

```

1  # ##### IN THE NAME OF ALLAH #####
2  # PUSHOVER ANALYSIS OF STEEL COLUMNS WITH AXIAL AND ROTATIONAL SPRINGS
3  # FOR MODELING BEAM COLUMN JOINTS
4  #
5  # THIS PROGRAM WRITTEN BY SALAR DELAVAR GHASHGHAEI (QASHQAI)
6  # EMAIL: salar.d.ghashghaei@gmail.com
7  #
8  #####
```

```

9 #%%-
10 # PAPER: Study on Structural Behaviour of Fully Bolted Beam Column Joints in Modular Steel Buildings
11 'https://link.springer.com/chapter/10.1007/978-3-031-12011-4\_63'
12 # MASTER THESIS: MODELING OF INTERIOR BEAM-COLUMN JOINTS FOR NONLINEAR ANALYSIS OF REINFORCED CONCRETE FRAME!
13 'https://tspace.library.utoronto.ca/bitstream/1807/75836/3/Pan\_Zhangcheng\_201611\_MAS\_thesis.pdf'
14 # YOUTUBE: Beam column joint modelling in ABAQUS
15 'https://www.youtube.com/watch?v=j33VlhZ9oZo'
16 # YOUTUBE: ABAQUS Tutorial, Reinforced Concrete Beam-Column Joint Modeling, Analysis and behavior
17 'https://www.youtube.com/watch?v=AfeYRbJ0fzw'
18 #%%-
```

```

19 # Load the image
20 def PLOT_IMAGE(image):
21     import matplotlib.pyplot as plt
22     import matplotlib.image as mpimg
23     image = mpimg.imread(image_path)
24
25     # Display the image
26     plt.figure(figsize=(12, 8))
27     plt.imshow(image)
28     plt.axis('off') # Hide axes
29     plt.show()
30
31 image_path = 'STEEL_COLUMN_JOINTS.jpg'
32 PLOT_IMAGE(image_path)
33 #%%-
```

...\\Dell\\Desktop\\OPENSEES_FILES\\CONCRETE_COLUMN_JOINTS_CONTACT

27 %

Steel Joints

Help Variable Explorer Debugger Plots Files

Console 1/A

```

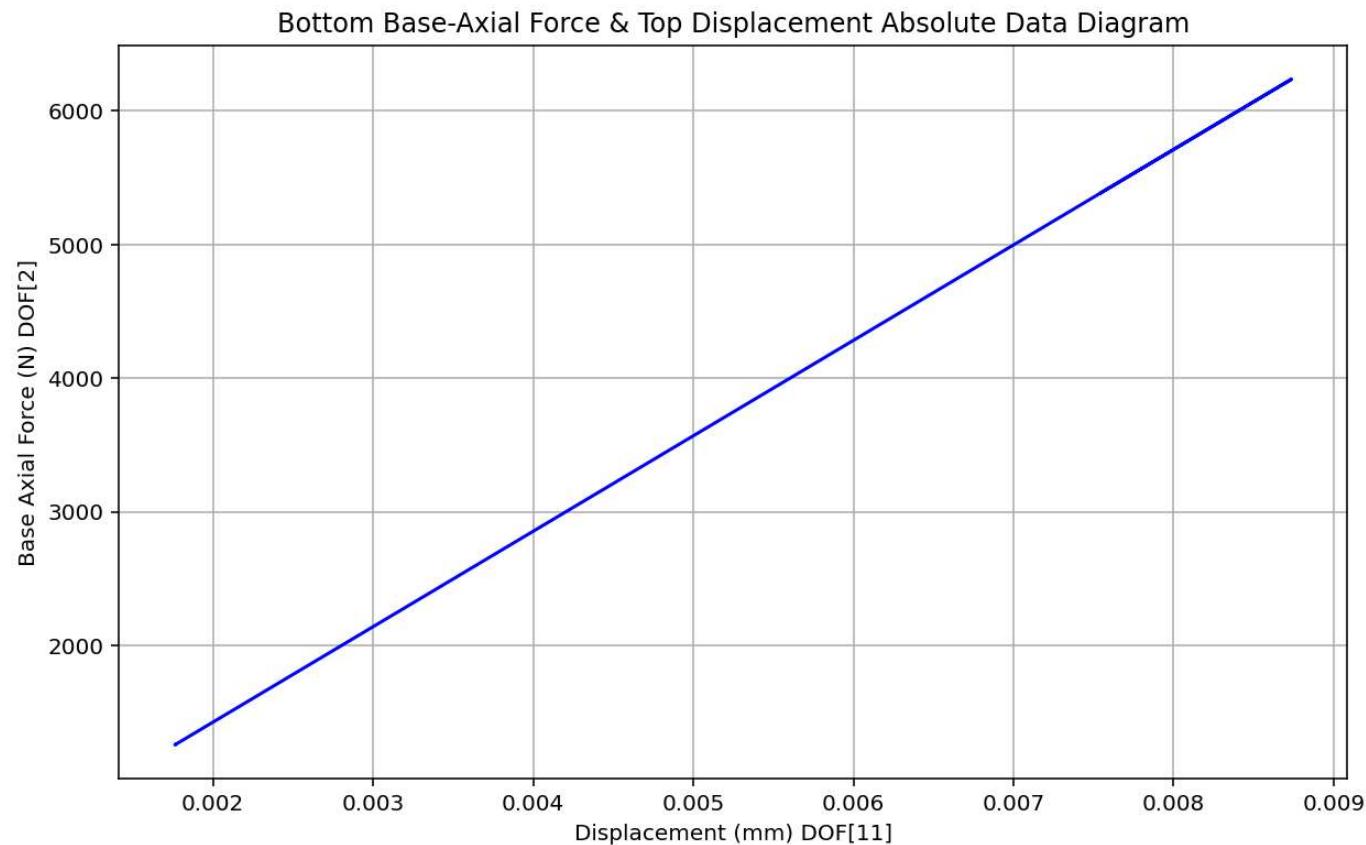
WARNING ZeroLength::checkDirection - incorrect direction 10 is
set to 0
WARNING ZeroLength::checkDirection - incorrect direction 11 is
set to 0
WARNING: CTestNormUnbalance::test() - failed to converge
after: 20000 iterations current Norm: 8.17039e-09 (max: 1e-10,
Norm deltaX: 8.60982e-16)
NewtonRaphson::solveCurrentStep() -the ConvergenceTest object
failed in test()
StaticAnalysis::analyze() - the Algorithm failed at step: 0
with domain at load factor -1077.83

```

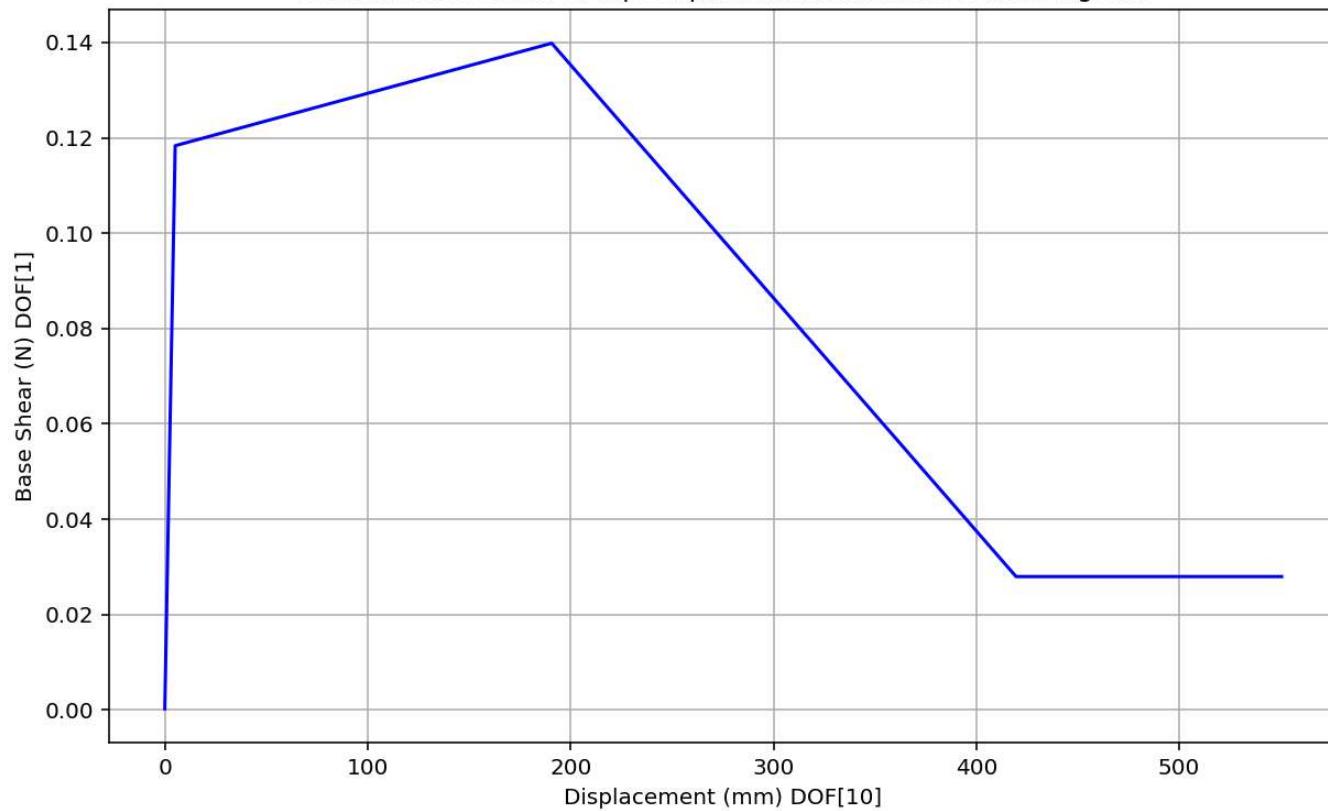
IPython Console History

Save file

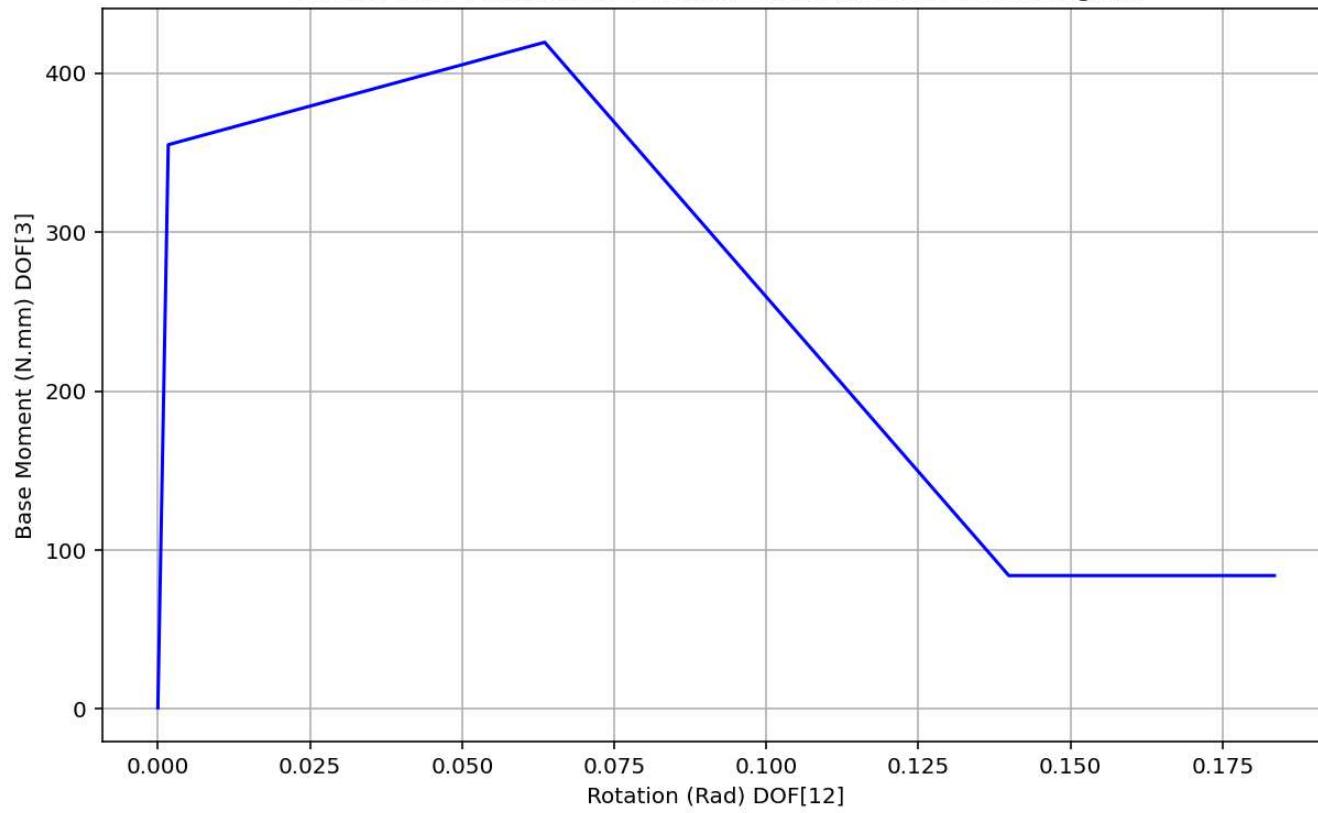
Inline Conda: anaconda3 (Python 3.12.7) ✓ LSP: Python Line 15, Col 31 UTF-8 CRLF RW Mem 36%



Bottom Base-Shear & Top Displacement Absolute Data Diagram



Bottom Base-Moment & Bottom Rotation Absolute Data Diagram



Bottom Base-Shear & Drift Absolute Data Diagram

