IIT Internship Screening Tasks - PythonOCC, PyPlot and CAD Development

Task 1: Bending Moment and Shear Force Diagram using PyPlot

In Task 1, I developed a Python program that reads beam load information from an Excel file (`loads.xlsx`) and plots the Bending Moment Diagram (BMD) and Shear Force Diagram (SFD) using matplotlib's PyPlot.

Key Features:

- Dynamic reading of input loads and beam spans from Excel.
- Calculates reaction forces using static equilibrium.
- Computes shear force and bending moment at discrete points.
- Displays the final diagrams with labels using PyPlot.

How to run:

1. Ensure Python 3.x and the libraries `matplotlib`, `pandas`, and `openpyxl` are installed.
2. Place the `main.py` and `loads.xlsx` in the same folder.
3. Run `python main.py` to generate and view the plots.

Code and resources can be found at: https://github.com/dhinokevin/PythonOCC-and-PyPlot/tree/main/Task1

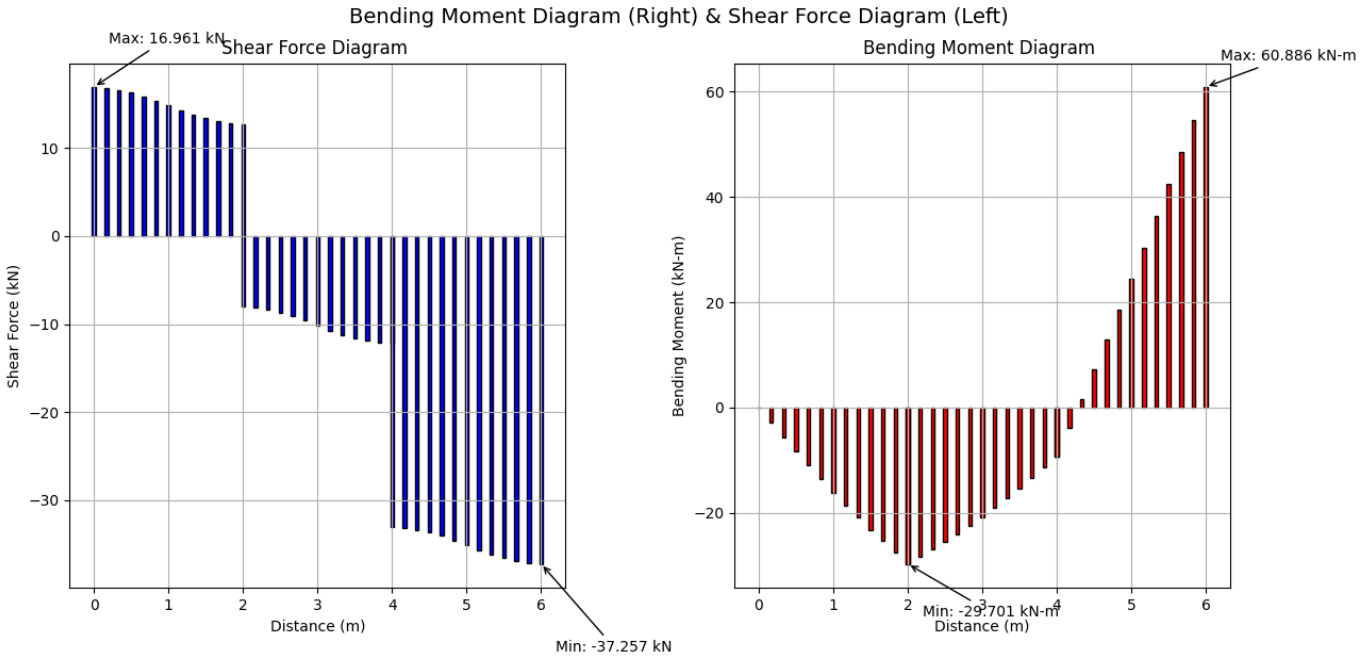

Figure: Shear Force and Bending Moment Diagram Output

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Task 2: Laced Compound Column CAD using PythonOCC

In Task 2, I created a Python script using PythonOCC to design a 3D CAD model of a laced compound column as per the reference image.

Key Features:

- Builds main vertical columns using TopoDS_Shape primitives.
- Generates lacing with support beams connecting the vertical columns.
- Proper constraints and visualization are applied using OCC's display features.

How to run:

1. Install `pythonocc-core` using pip.
2. Ensure OpenCASCADE is properly set up.
3. Place the `main.py` in the `Task2` folder.
4. Run `python main.py` to visualize the CAD model.

Code and resources can be found at: https://github.com/dhinokevin/PythonOCC-and-PyPlot/tree/main/Task2

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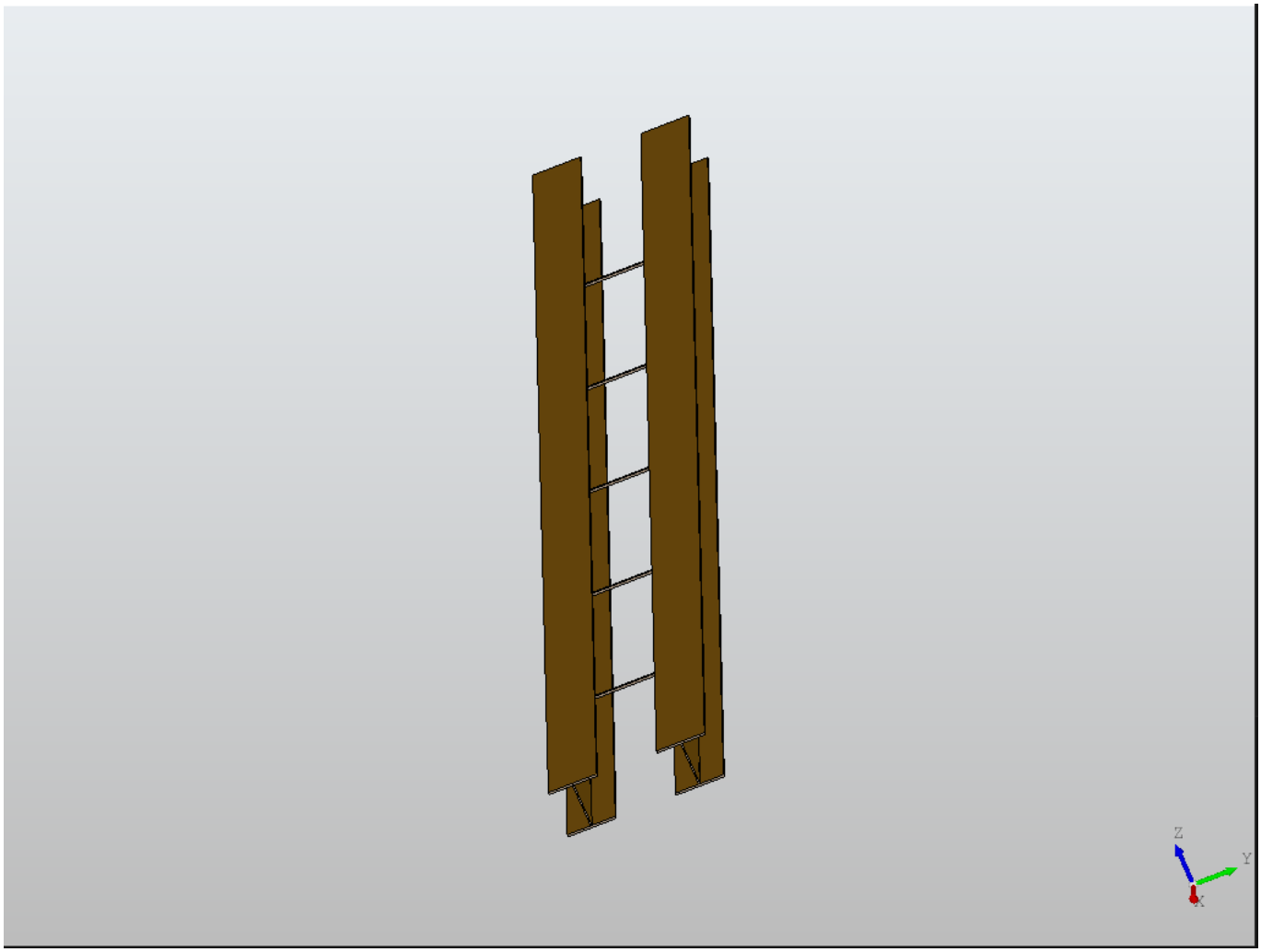

Figure: 3D CAD Model of Laced Compound Column