Structure Tool in Freecad: how to use

1 Intro info:

FreeCAD is open-source software that can integrate with Python packages.
Structure Tool is a FreeCAD extension for structural analysis, utilizing the Pynite kernel to perform calculations and display results

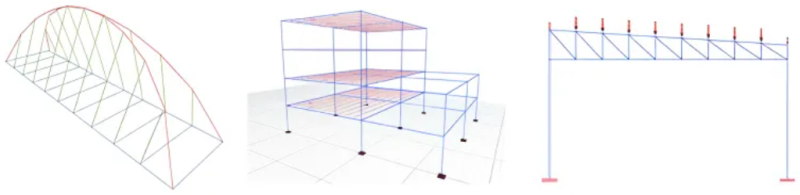

Figure 1:

2 How to use:

From Freecad select Structure Tool WB

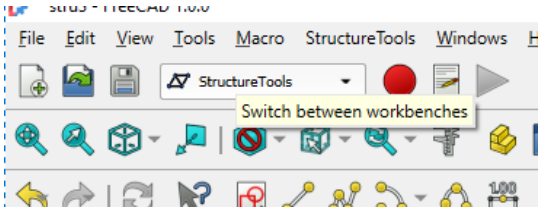

Figure 2:

* Click New button to create empty model
* Click Line on toolbar to create line for beam/ column structure

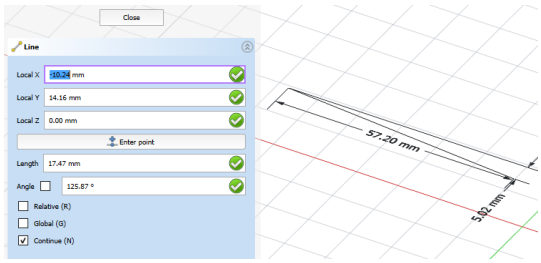

Figure 3:

∗ Select endpoint of line then click support button

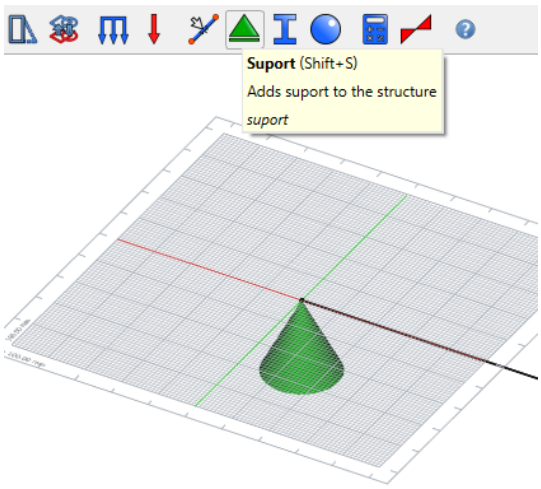

Figure 4:

– in tab of support select restraint required

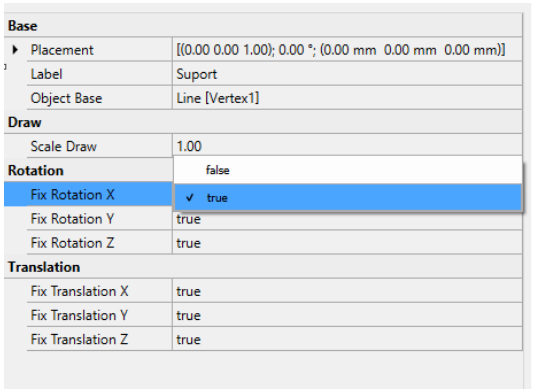

Figure 5:

∗ Create & assign section

– Click sketch button to make a sketch. Sketch will be in plane XY (important note) and try to make sketch in center of (0,0,0)

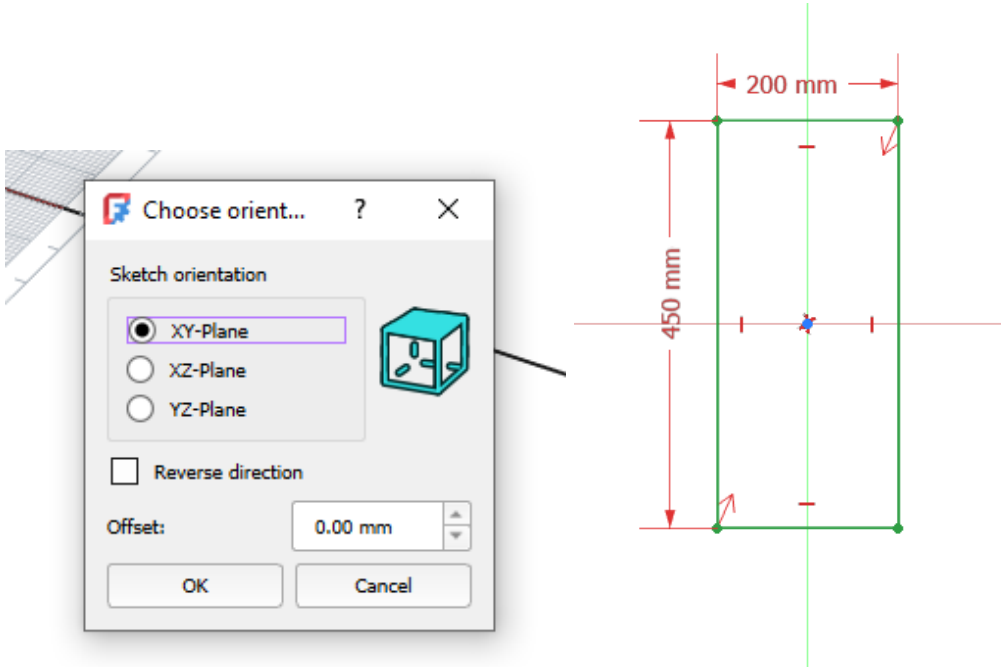

Figure 6:

– Convert sketch to wire

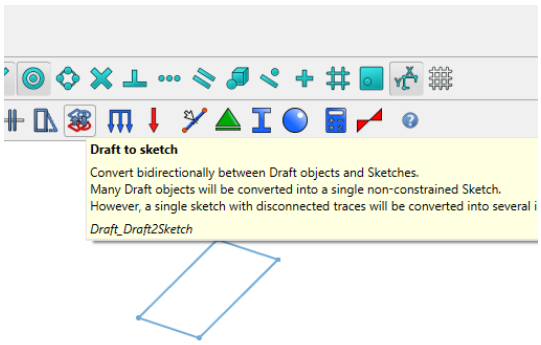

Figure 7:

– from wire created, select make face

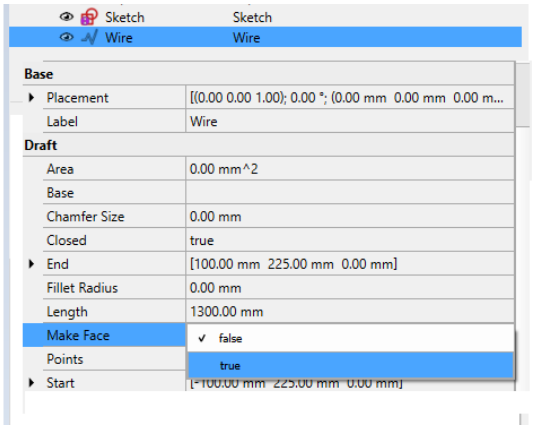

Figure 8:

– put pointer on created face then click section button (important note)

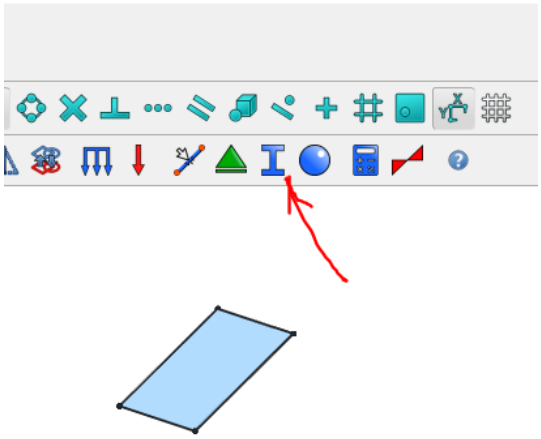

Figure 9:

– section will create with parameter for moment inertia info

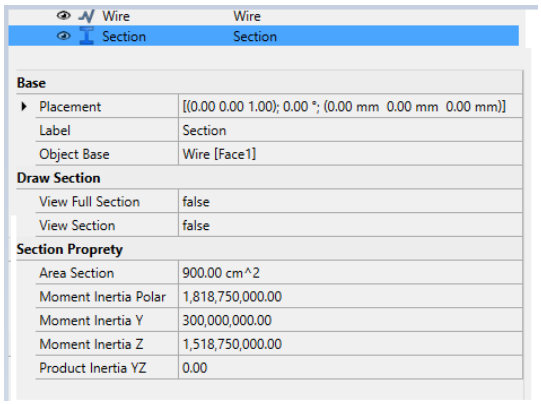

Figure 10:

∗ Create material

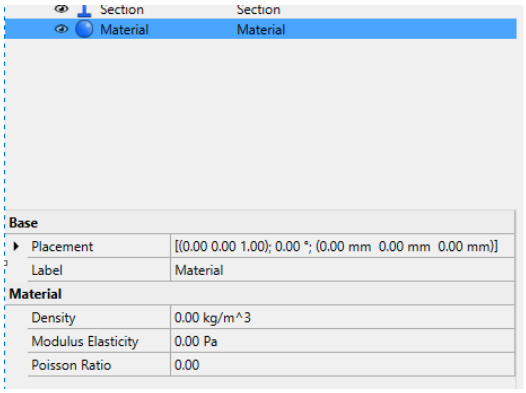

Figure 11:

∗ Select line & define section, material

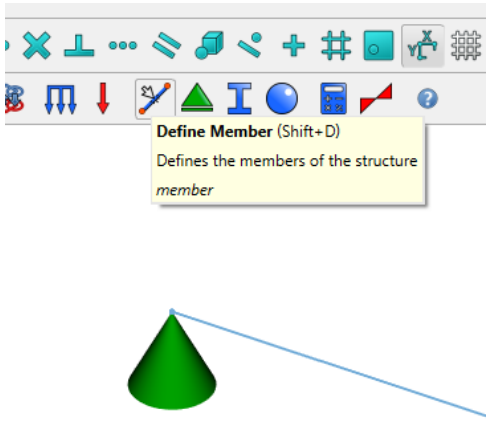

Figure 12:

– in line tab properties will appear Structure info

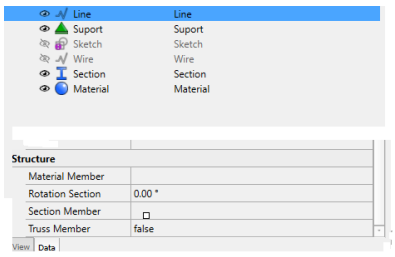

Figure 13:

– click "..." then select material, section already defined in list

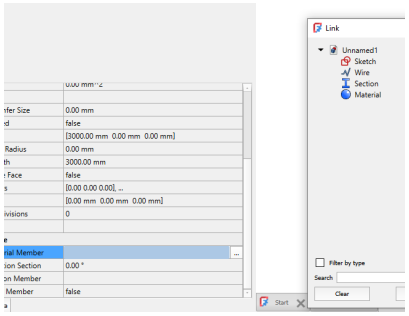

Figure 14:

∗ select line structure and apply load

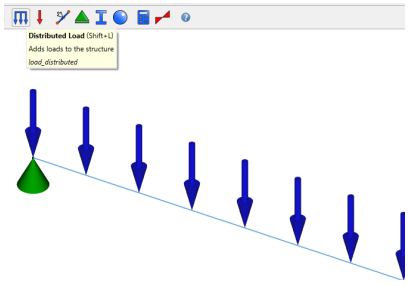

Figure 15:

∗ select whole model by box selection (important note)

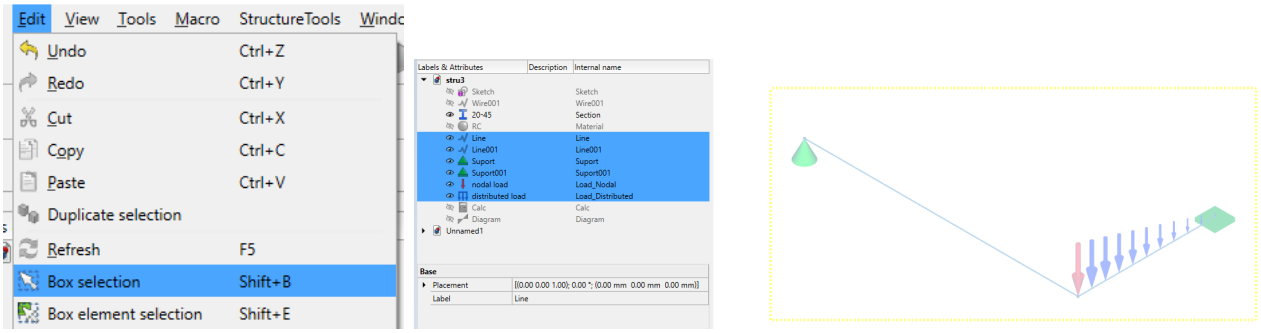

Figure 16:

– click Calc button to run analysis

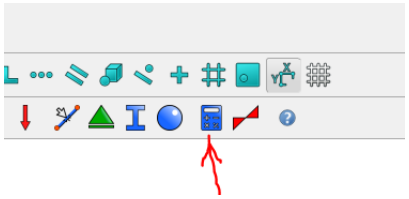

Figure 17:

– Calc will appear in tab properties with values moment, shear, deflection

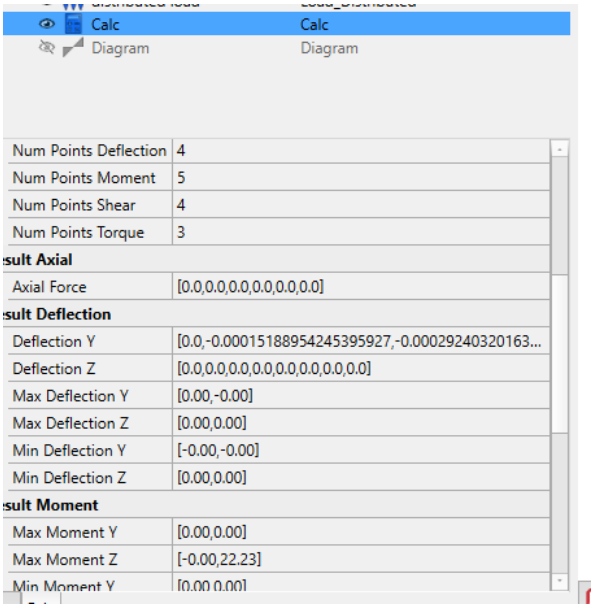

Figure 18:

∗ click diagram to see BD or SD

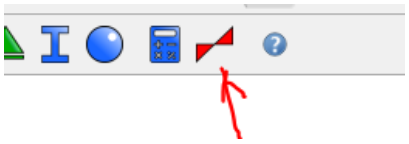

Figure 19:

– on tab properties of diagram, select "true" to show value on beam

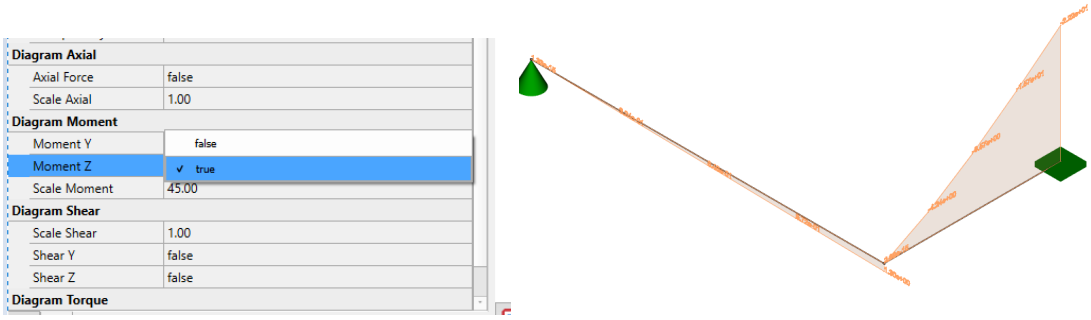

Figure 20:

3 Summary:

We gratefully acknowledge Maykow Menezes for his development of Structure Tools.
This extension provides a user-friendly way to visualize and interpret Pynite results within FreeCAD, significantly

reducing the need for direct Pynite coding expertise. You can explore the project and its source code at: https://github.com/maykowsm/StructureTools.

We extend special thanks to Yorik Van Havre for developing Freecad Platform

4 Appendix: Testing result

4.1 Example 1:

* Simple beam under uniform load & bending diagram

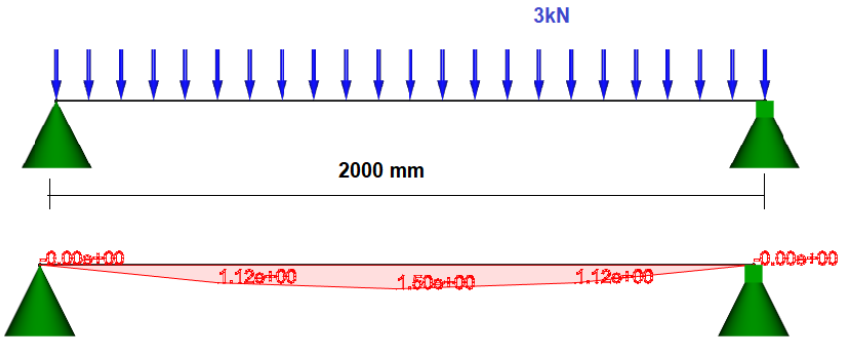

Figure 21:

* Result by anatruct - Python package

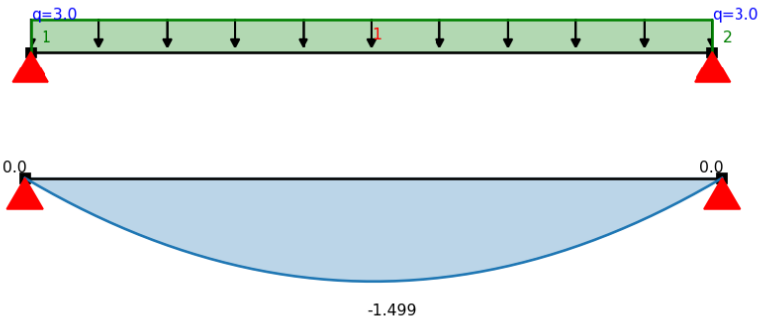

Figure 22:

4.2 Example 2:

* Simple beam under uniform load, point load & bending diagram

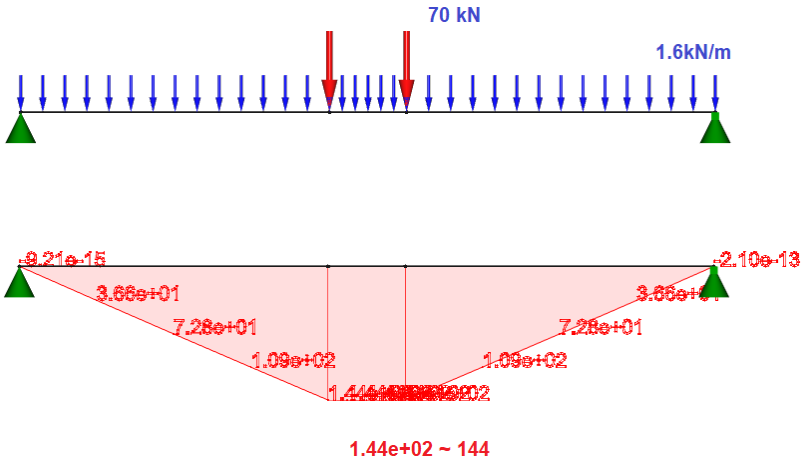

Figure 23:

∗ Result by anatruct - Python package

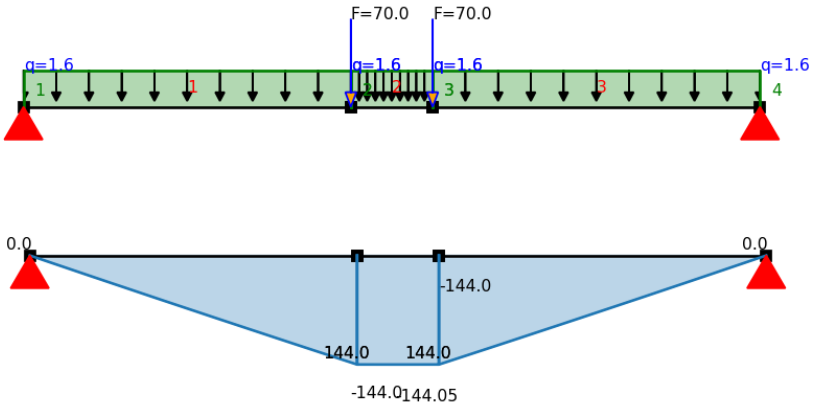

Figure 24:

∗ Result by Ftool

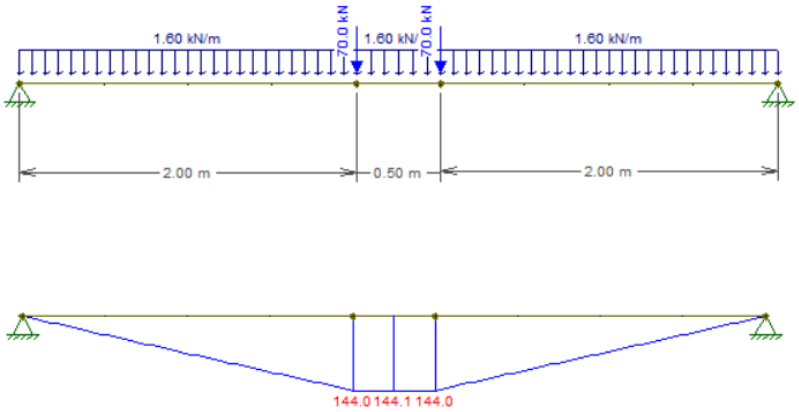

Figure 25:

4.3 Example 3:

∗ Frame structure uniform load & bending diagram

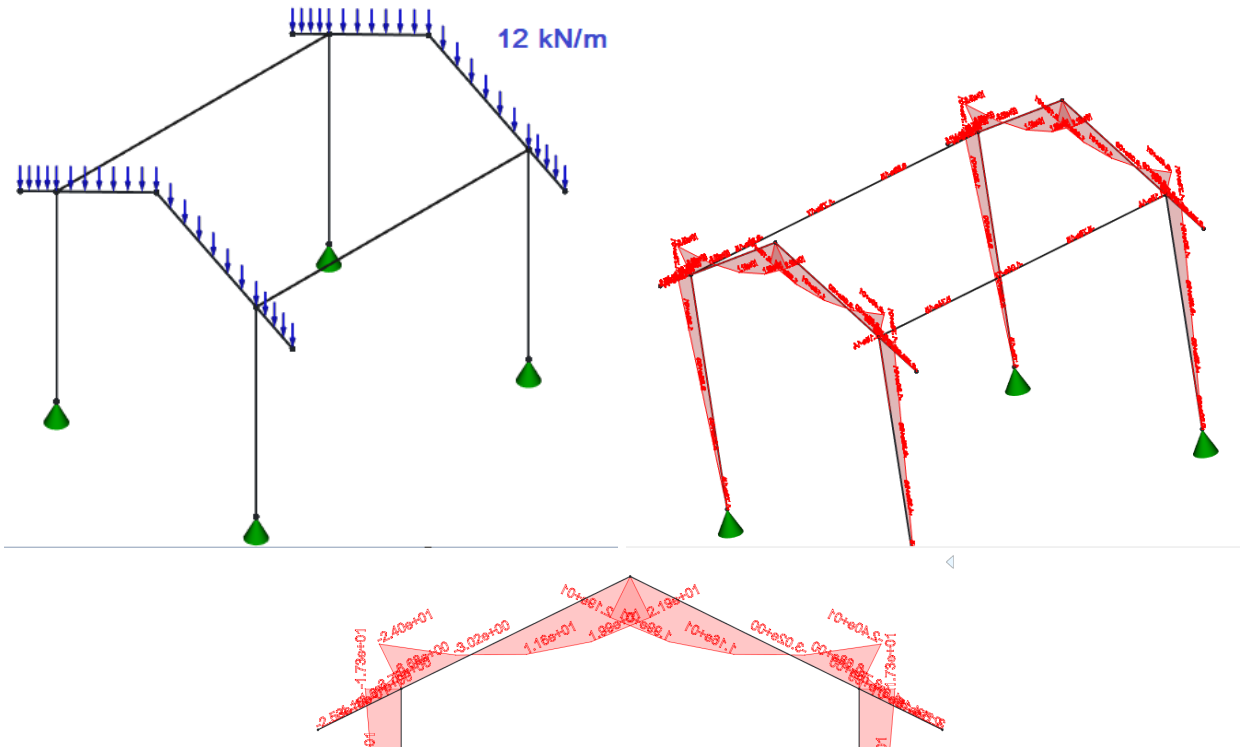

Figure 26:

∗ Result by Structure Tool

∗ 2D Frame structure uniform load & bending diagram

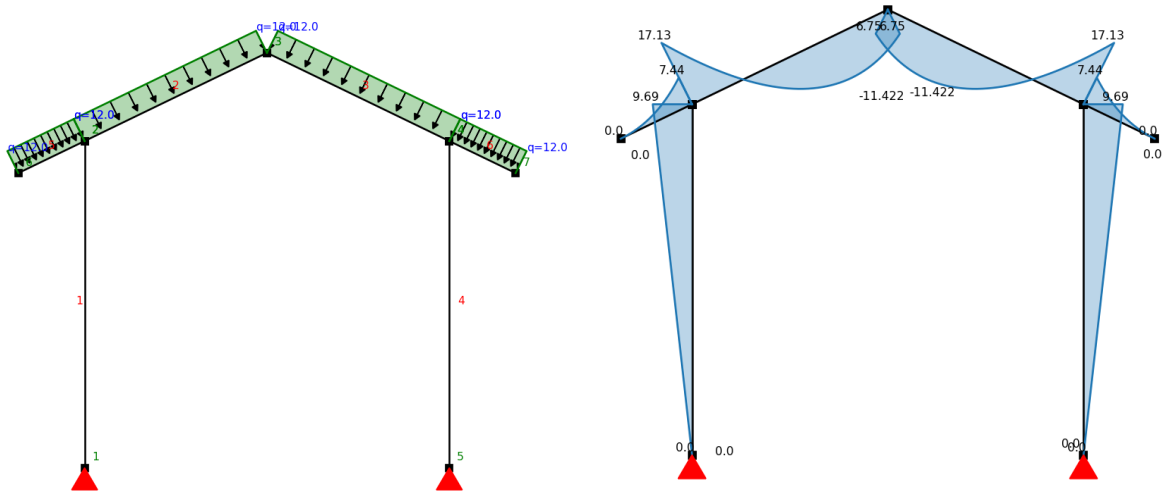

Figure 27:

* Result by Anastruct

Got a bit different result value cause in Anastruct assigned load in default perpendicular with member frame

The good point, Structure tool can do analysis 3d model which other free package, software be limited