ES 221: Mechanics of Solids

ANALYSIS OF TRUSS SYSTEM

GROUP 5

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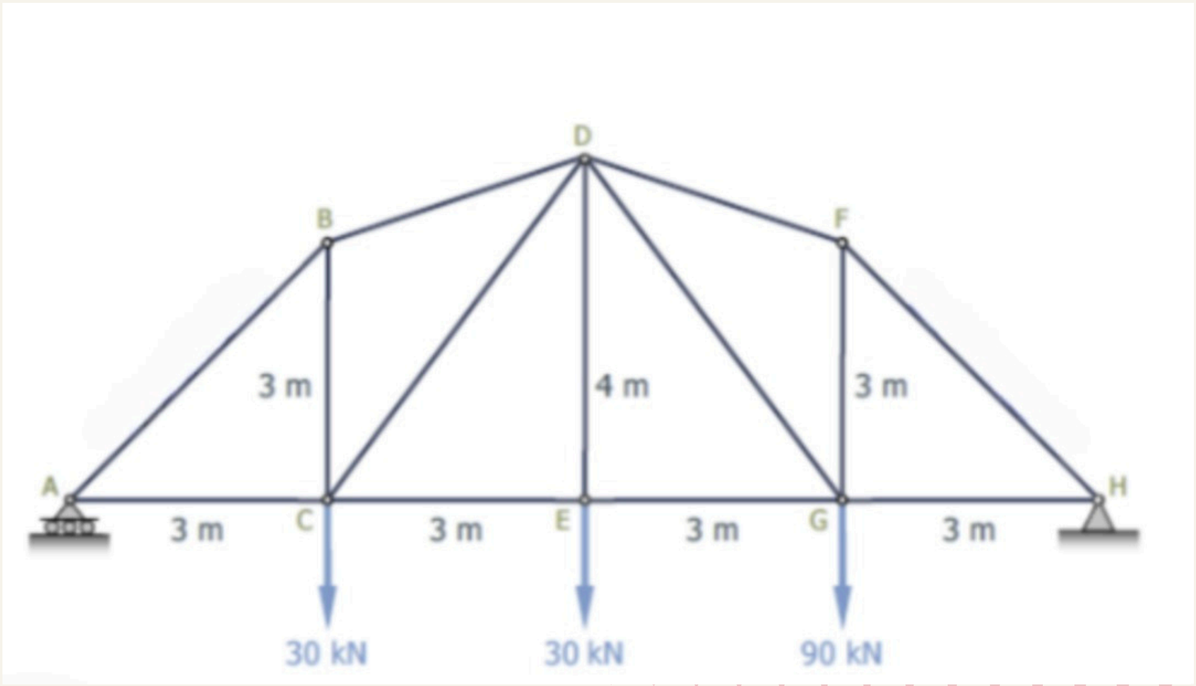
PROBLEM STATEMENT

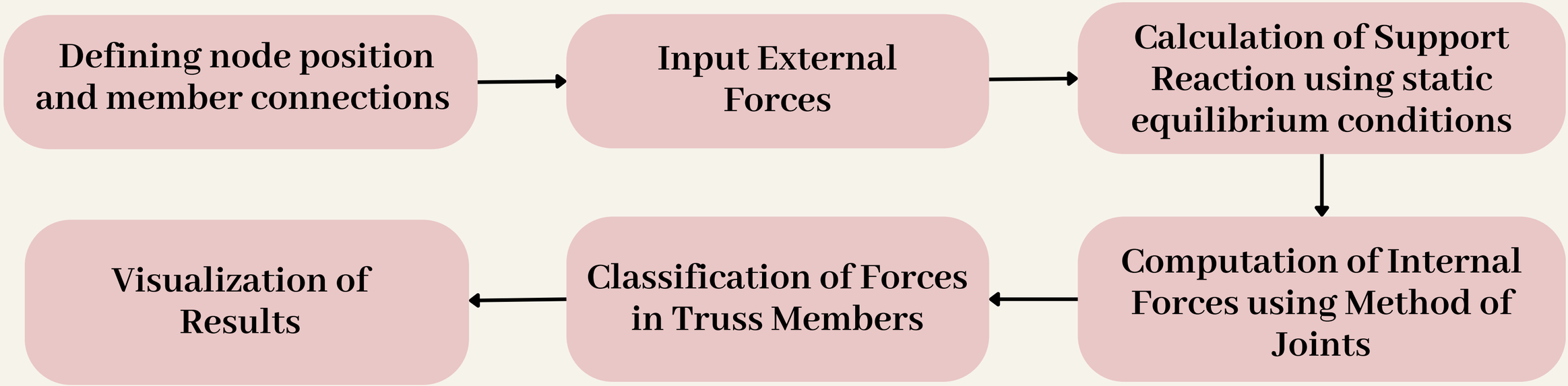
Trusses are essential structural systems commonly used to support loads in bridges, towers, and buildings. In such structures, members are subjected to axial forces—either tension or compression—depending on the loading conditions and support configuration. This problem involves analyzing a fixed truss to determine the internal force in each of its members and to classify the nature of these forces as either tensile or compressive.



METHODOLOGY

- Tool used: Wolfram Mathematica
- Methods used : 1) Static Equilibrium Equation 2) Method of Joints

STEPS INVOLVED

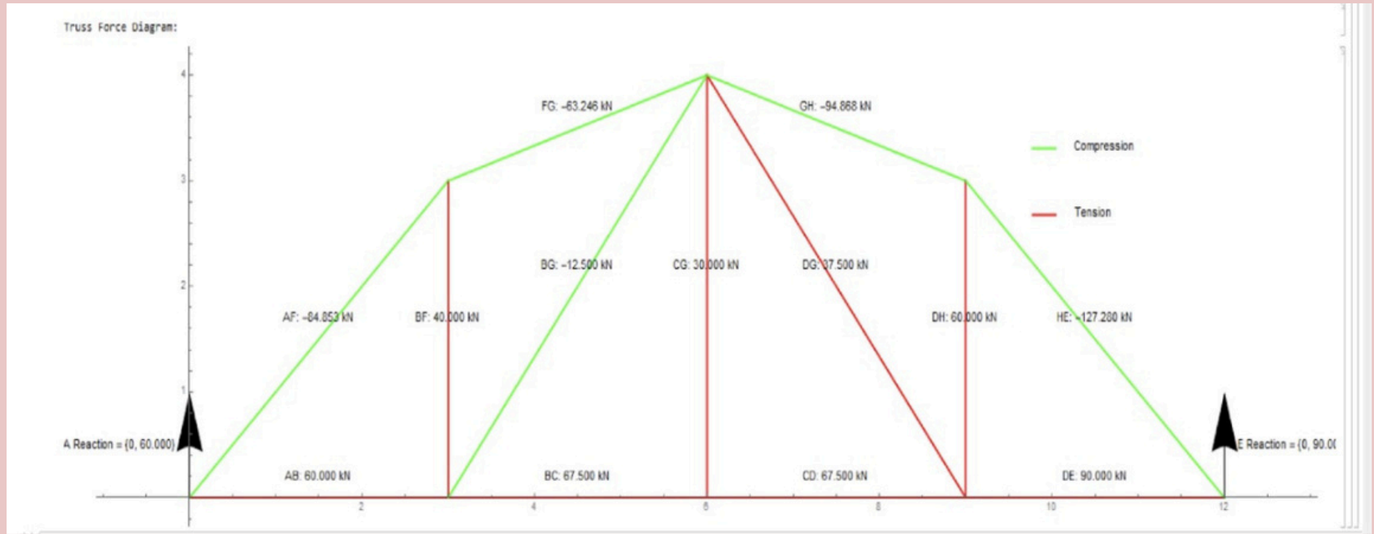


RESULTS

Computed values and Nature of the Force in Truss Members

Member	Nature of Force	Force (kN)
F_{AB}	Tensile	60.000
F_{BC}	Tensile	67.500
F_{CD}	Tensile	67.500
F_{DE}	Tensile	90.000
F_{AF}	Compressive	84.853
F_{BF}	Tensile	40.000
F_{FG}	Compressive	63.246
F_{CG}	Tensile	30.000
F_{GH}	Compressive	94.868
F_{DH}	Tensile	60.000
F_{HE}	Compressive	127.280
F_{BG}	Compressive	12.500
F_{DG}	Tensile	37.500

Visualization of Truss Force Diagram



CONCLUSION

1. Successfully analyzed a fixed truss using static equilibrium and the Method of Joints.
2. Developed a Mathematic tool to compute and visualize internal forces.
3. Results aligned with theory and provided clear structural insights,