M6 Method of Sections

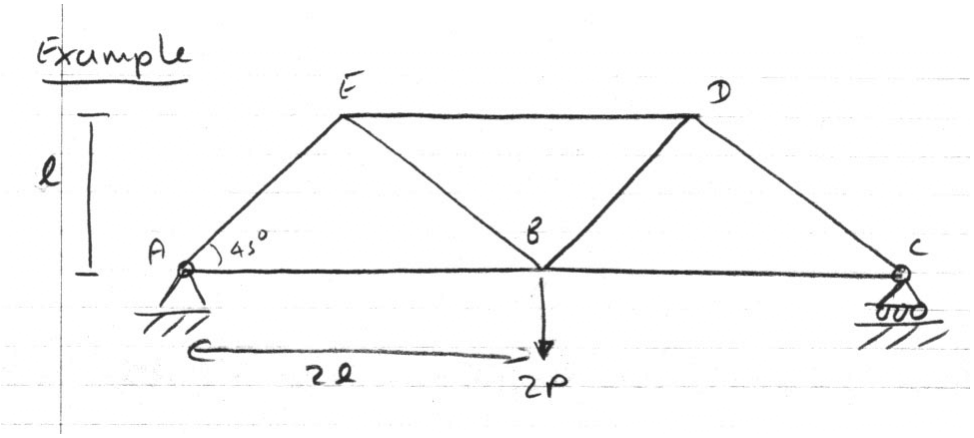
Isolate a section (part) of the truss of interest

- Draw FBD, determine reactions
- "cut" truss into sections (through bars)
- Replace cut bars by coincident tensile forces
- Apply planar equilibrium equations (positive tensile, negative compressive)

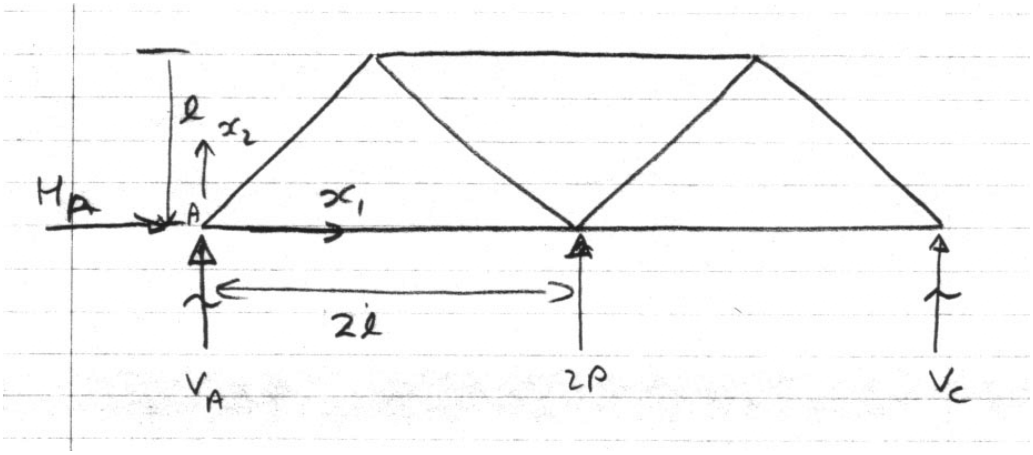
All as for Method of Joints

- But now can use equilibrium of moments
- can now have 3 unknown bar forces in a section

EXAMPLE



First draw FBD



$$\sum F_1 = 0 \xrightarrow{+} \Rightarrow H_A = 0$$

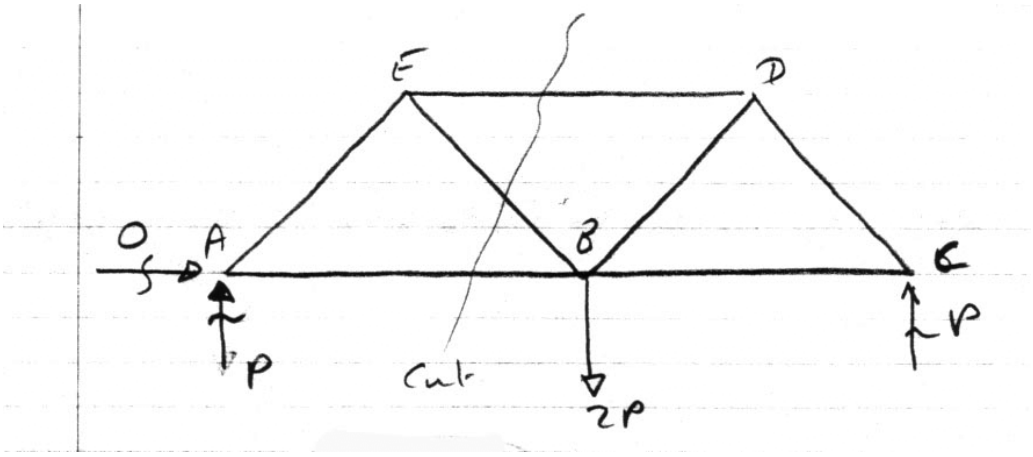
$$\sum F_2 = 0 \uparrow + \Rightarrow V_A + V_C - 2P = 0$$

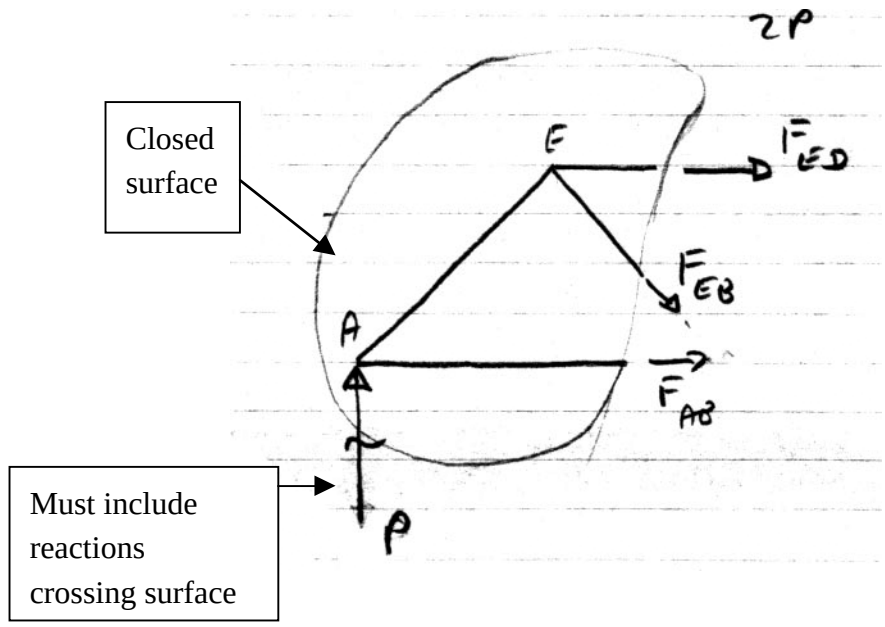
$$\sum M_3 = 0 \circlearrowleft A+ \Rightarrow -2P.2l + 4lV_C = 0$$

$$\Rightarrow \quad \boxed{V_C = +P}$$

$$\Rightarrow \quad \boxed{V_A = +P}$$

We are interested in bar *ED*. So take an appropriate cut.





Want to find F_{ED}, one equation one unknown

→Take moments about *B* (draw in *B*)

$$\sum M_B : +2LP - LF_{ED} = 0$$

$$F_{ED} = -2P$$

Suppose we had wanted F_{ED}

Suppose we had wanted F_{AB}

Redraw FBD. Is this correct?

- Think about cutting members *ED* - shortens *AB* - opens

NOTE:

In both methods of joints, method of sections, we solve for the internal forces by isolating part of the structure.

Two Tips:

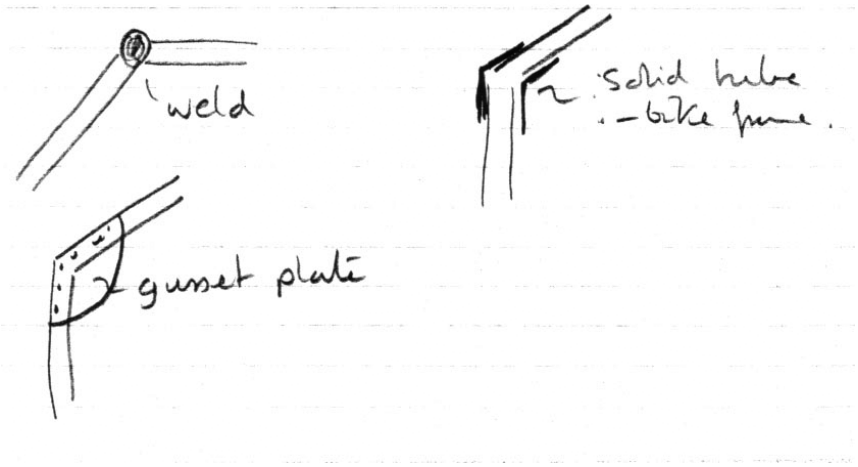
- Reduce computation by intelligent choice of method & section to analyze
  1 equation, 1 unknown
- Check, check & double check as you go

- simultaneous equations

Joint Realities

Frictionless pins are an idealization of reality.

Joints are generally more restrained



Nevertheless the idealization of a pin jointed truss can go quite a long way to modeling how real truss-like structures carry loads