https://opensees.berkeley.edu/OpenSees/manuals/usermanual/237.htm

* The local x-axis is in the direction of the element
* The orientation of the local-y & z axes is defined using the right hand rule:
  - Thumb : x-axis
  - Index : y-axis
  - Middle finger : z-axis

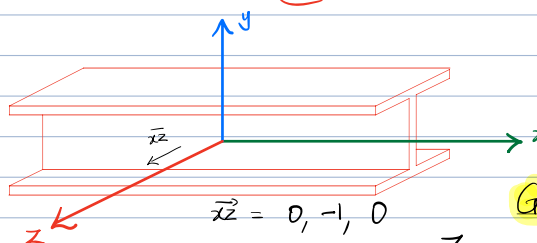
Geometric Transformation :- Used to transform an element in its local coordinate to the global coordinate of the model.

- This is done by specifying any vector in the local xz plane of the element.
- Note that this $\vec{xz}$ cannot be parallel to the z-axis.

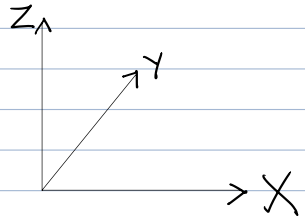
* Vector $\vec{xz}$ is defined using the Global coordinate system.

SMF Model

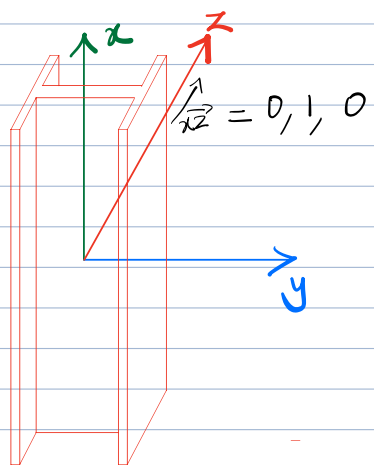
Beams running E-W



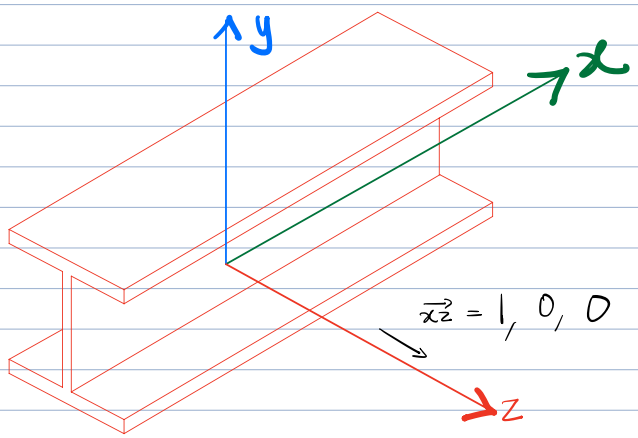
Global



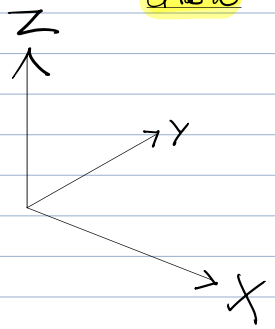
Columns for E-W SMF



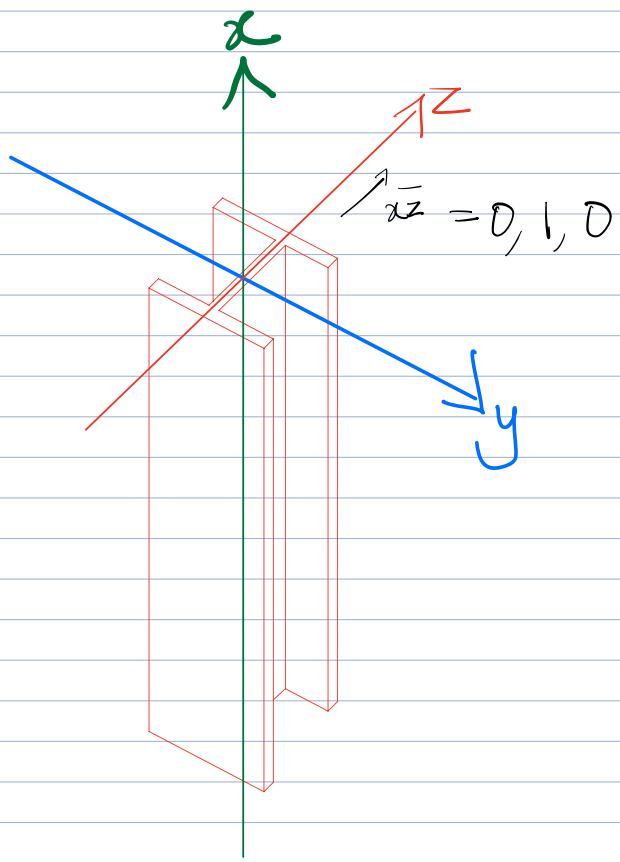
Beams running S-N



Global

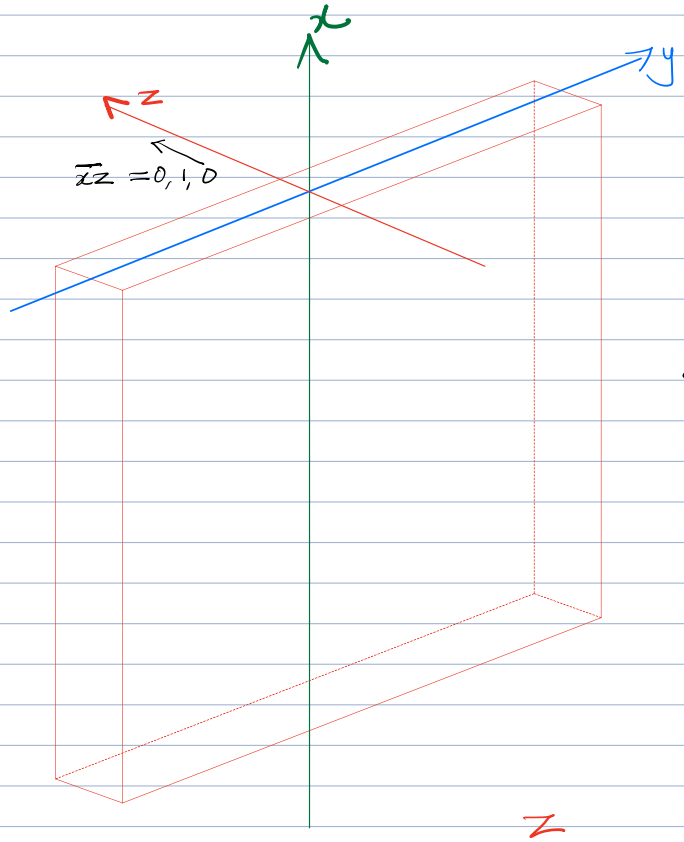


Columns for S-N SMF

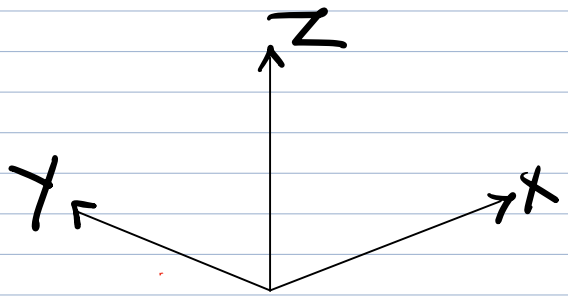


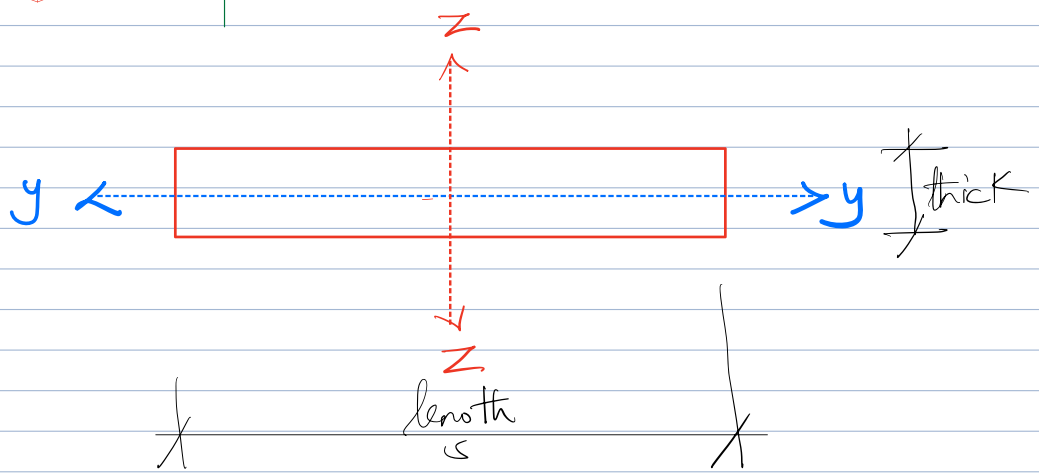
RCSW Model

Walls in EW orientation:



Global Coordinate

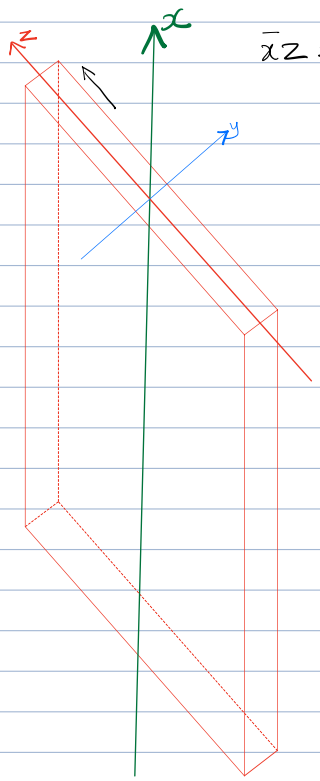




$$I_{yy} = \frac{\text{length} \times \text{thick}^3}{12}$$

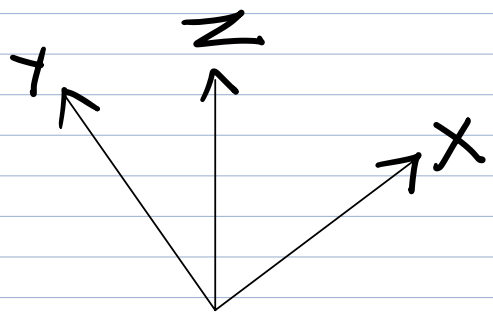
$$I_{zz} = \frac{\text{length}^3 \times \text{thick}}{12}$$

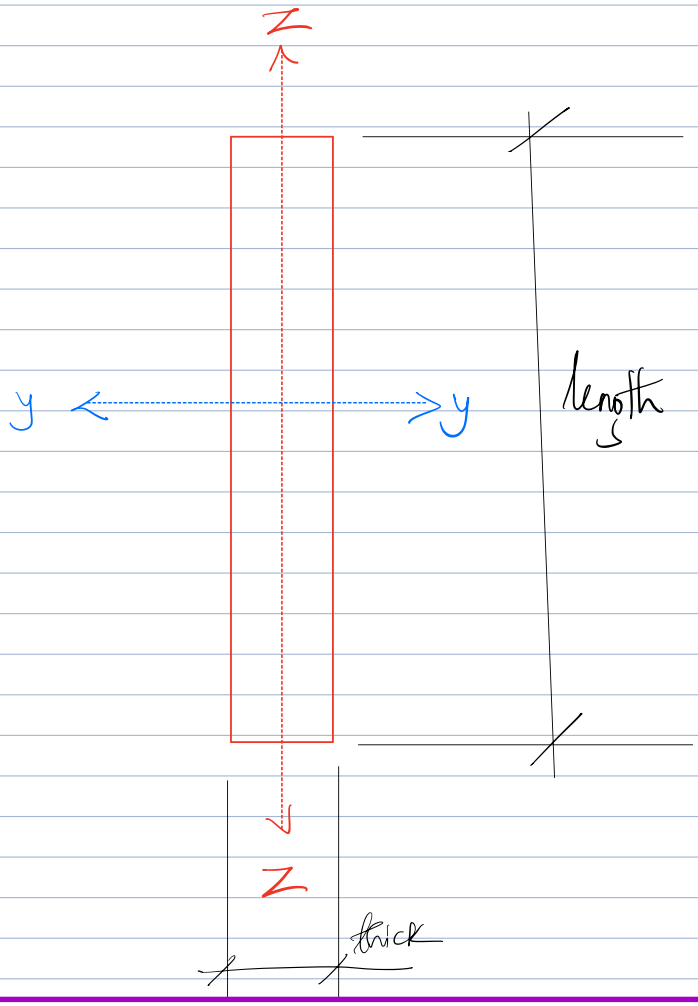
Walls in NS Orientation



$\bar{x}z = 0, 1, 0$

Global Coordinates





$$I_{yy} = \frac{\text{length}^3 \times \text{thick}}{12}$$

$$I_{zz} = \frac{\text{length} \times \text{thick}^3}{12}$$