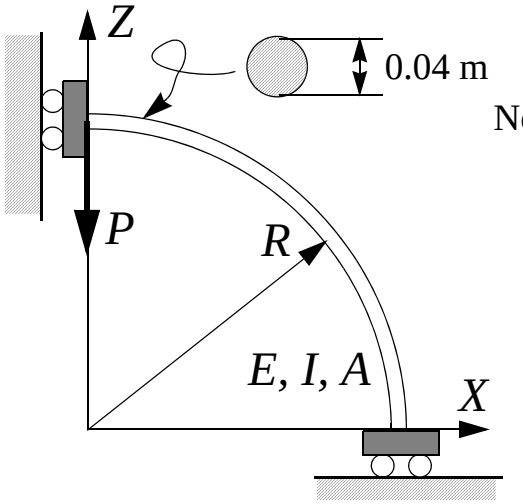
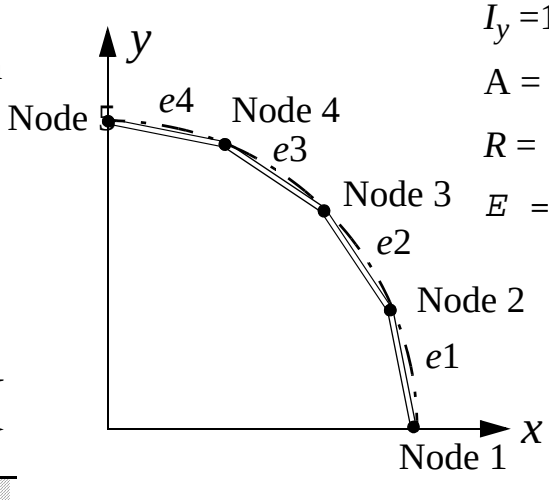
Matlab program: frame2D

Example:

FEM analysis with 4 beam elements





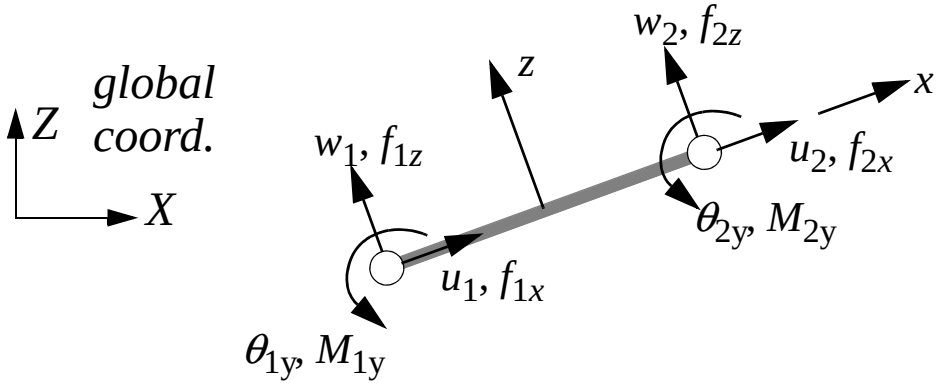
I_y =1.257E-6 m^4

A = 1.257E-3 m^2

R = 1 m

E = 200 GPa

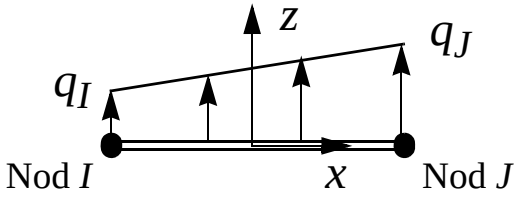
2 Node element with 3 D.O.F. (degrees of freedom) / node



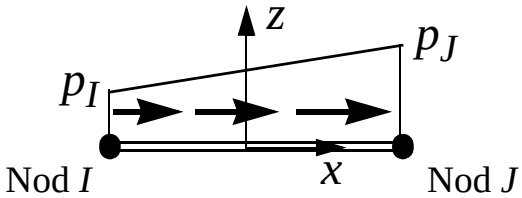
$$\mathbf{d}_e = \begin{bmatrix} u_1 \\ w_1 \\ \theta_1 \\ u_2 \\ w_2 \\ \theta_2 \end{bmatrix}$$

Two types of distributed loads (force/unit length) is defined with reference to the local coordinate system of the element. Note that the pos. direction for the loads are given by the local *xz*-system.

"acting perpendicular to the beam"



"axial direction of the beam"



The load input data to the Matlab program are given as the load intensity value at the local nodes in the each element subjected to a distributed load. Example: distributed load on element number = *e*

```
*PerpDistributedForce
e, q_I, q_J
*AxialDistributedForce
e, p_I, p_J
*END
```

Input data to the Matlab program is written to the file: *frame2D.inp*

(the data below are valid for the quarter arc example above)

```
*NODE [node number, x-coordinate, z-coordinate]
1, 1.0,    0.0
2, 0.9239, 0.3827
3, 0.7071, 0.7071
4, 0.3827, 0.9239
5, 0.0,    1.0
*ELEMENT [element number, nod 1, nod 2, E-module, Area, Iy]
1, 1,  2,  200E9,  1.257E-3, 1.257E-6
2, 2,  3,  200E9,  1.257E-3, 1.257E-6
3, 3,  4,  200E9,  1.257E-3, 1.257E-6
4, 4,  5,  200E9,  1.257E-3, 1.257E-6
*ZeroDOF [node number, dof]
1, 2
1, 3
5, 1
5, 3
*PointForceMoment [node number, dof, value]
5, 2, -P
*PerpDistributedForce [element number, q_I, q_J]
*AxialDistributedForce [element number, p_I, p_J]
*END
```