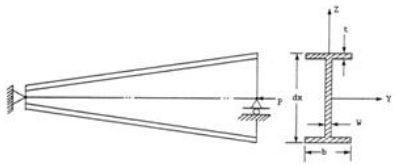
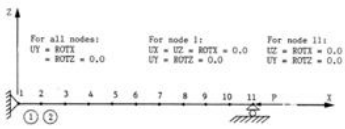
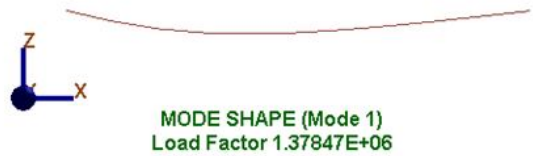
Buckling analysis of a simply supported tapered beam







Boundary condition: U_y, R_z = 0 at all node; U_z, R_x = 0 at both the ends; U_x = 0 at left end

Material property : $E_x = 3.0 \times 10^7 psi$, $\nu = 0.3$

Element type : 3-D tapered beam element

Geometry :

A	=	$2td + (d_x - 2t)w$	(Cross-sectional area, see
IZZ	=	$\frac{w}{12}(d_x - 2t)^3 + \frac{bt}{2}(d_x - t)^2$	(Area moment of inertia about beam Z-axis, see
b	=	4.0 in	(width of the flange)
t	=	0.25 in	(thickness of the flange)
W	=	0.1 in	(thickness of the web)
d_o	=	6.0 in	(height of the smallest cross-section)
d_x	=	$d_o\left(1 + \frac{3x}{L}\right)$	(height of the cross-section at a distance x)

Load : 1 *psi*

Finite Element Statistics :

Number of elements	Number of nodes	Degrees of freedom
10	11	30

Output parameters x 10^4	Theoretical	FEAST^{SMT}	NISA2®
Buckling Mode Mode 1	136.87	137.85	136.65