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Thin walled C-Sectional Beam under Axial Load

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Abstract*: *Ab A thin walled c- section beam is subjected under axial load. The influence of axial load is studied for different critical load conditions. For solid beams the formulation is also applied along with the theory of coupled of flexure and torsion of straight beams. for the critical load values 10,12.5,15,17.5,20. The differential conditions are demonstrated to be especially appropriate for investigation in the recurrence space utilizing a state variable methodology numerical is done to uncover the impact of the pivotal burden in a few limit conditions. A streamlined hypothesis, which bars the examination the distorting requirements, is displayed prompting an increasingly basic hypothesis that is utilized for correlation purposes in this venture.

Keywords* : *Axial Load, critical loads, structure, thin walled beams.

I. INTRODUCTION

Aircraft undergoes two distinct classes of loads. All the loads applied on the aircraft are during movement on the ground. They are taxiing and landing loads, towing loads.

Structure undergoes air loads during maneuvers and gust conditions. The air loads and ground loads are classified into surface forces and body forces. Surface forces which act upon the surface of the structure and body forces which act over the volume of the structure and are produced by gravitational and inertial effects.

II. AXIAL LOAD

Axial load can be also be applied for civil structures along with aerospace and mechanical application. axial load can be generated because of self weight and centrifugal forces. A rigid body carries a transverse vibration at the end of the rigid body

.Recall from material mechanics that the internal forces of the conventional axial, shear and moment are the result of the distribution of stress working on the beam's cross section

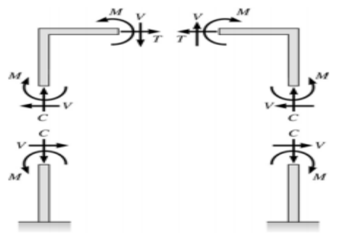
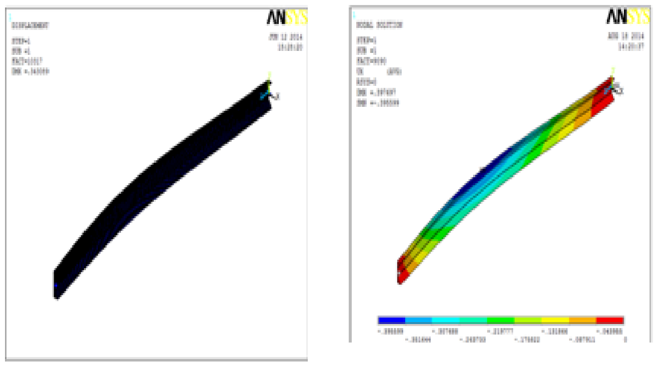
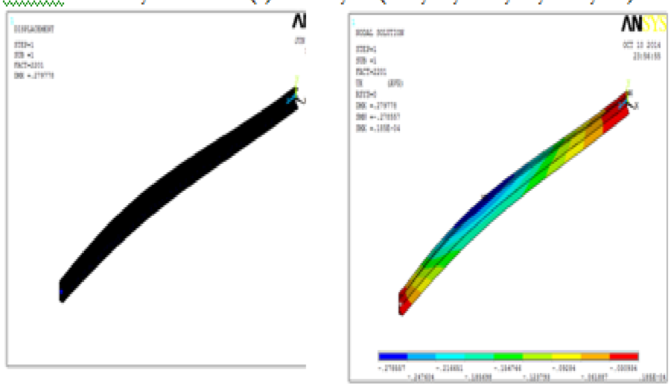


Fig. 1.Postive internal forces acting on beam

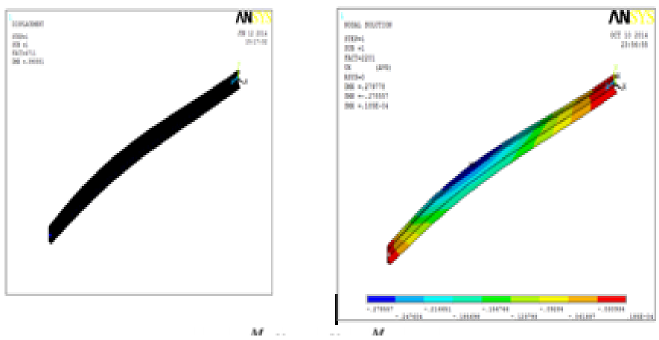
For e=40e-3, thickness(t)=0.6, λ=(7.5,10,12.5,15,17.5,20.0)



For e=40e-3, thickness(t)=1.10, λ=(7.5,10,12.5,15,17.5,20.)



For e=40e-3, thickness(t)=2.0, λ=(7.5,10,12.5,15,17.5,20.0)



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III. DESIGN SPECIFICATIONS

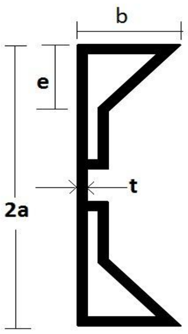


Fig. 1.C-Section

Dimensions of the cross sections

Length of the C-sectional beam=h
Height of the C-sectional beam H=2xa
Breadth f the C-sectional beam =b
Thickness of the C-sectional beam =t
Height of the flange C-sectional beam =e

Case1: **λ** and **Mcr** values for different thicknesses (t) at e=10

E= 10e-3				
λ = L/H)	t= 0.6	t=1.10	t=2.0	t= 3.14

Case 2: **λ** and **Mcr** values for different thickneses at e=20

E= 20e-3				
λ=7.5	t= 0.6	t=1.10	t=2.0	t= 3.14

Case 3: **λ** and $\mathbf{M_{cr}}$values for different thickness at e=30

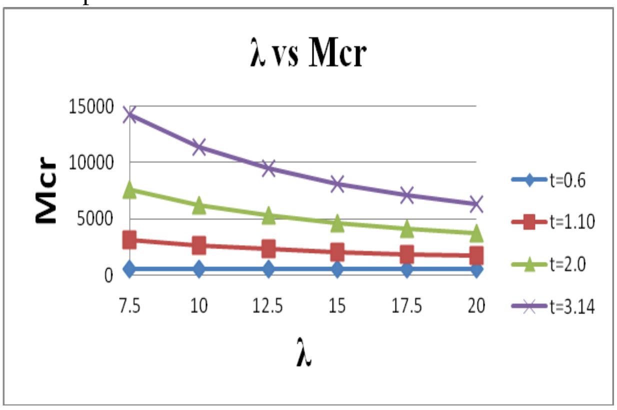
E= 30e-3				
λ=7.5	t= 0.6	t=1.10	t=2.0	t= 3.14

IV. RESULT

λ and $\mathbf{M_{cr}}$values for different thickness at e=30

E= 30e-3				
λ=7.5	T= 0.6	T=1.10	T=2.0	T= 3.14
7.5	Mcr= 83.41	3165.9	7656.9	14248
10	583.5	2647.4	6267.8	11371
12.5	583.43	2327.6	5336.9	9491.7
15	583.43	2083.6	4650.7	8152.2
17.5	583.42	1888.3	4121.8	7146.5
20	583.39	1728.3	3698.8	6362

Graph for **λ vs Mcr** for different thickness at e=30



V. CONCLUSION

The critical moment of the channel unsymmetrical thin-walled beam of length a= 80,b= breadth of the flange (37.81e-3), t= thickness of the flange (t= 0.6, 1.10,2.0,3.14) ,e= length of the flange at (30e-3) G= rigidity of modulus (1), h= height of the flange (1.2, 1.6, 2.0, 2.4, 2.8, 3.2) has been studied in this figure.

In this paper the critical moment and natural frequencies of non-symmetrical axially loaded thin walled beam is observed. The critical moment value is decreasing with increasing **λ= (L/H).** At λ= 7.5 the critical moment value is 502.68. by increasing λ to 20 the critical moment (Mcr) value decreased to 386.17 so due to increment length of the channel the Mcr is inversely proportional to its length.

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