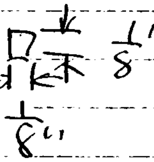
NOTES ON

The yielding Mechanism of flexural members.

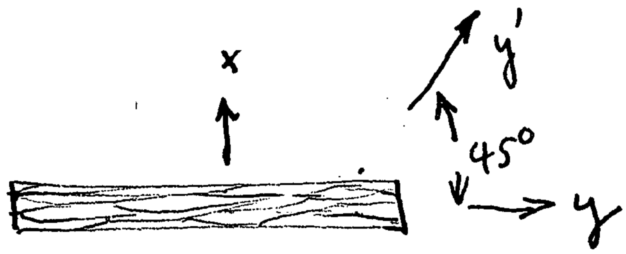
1. Developing and progressing of yielding zones in a bending member.
2. Slipping planes (Direction of) in Tension and Compression flanges
3. Lower yielding strength of comp. flanges. (Same yielding strength in Simple ~~and~~ tension or Comp. test)
4. Lower bending strength than the prediction

Proposed tests

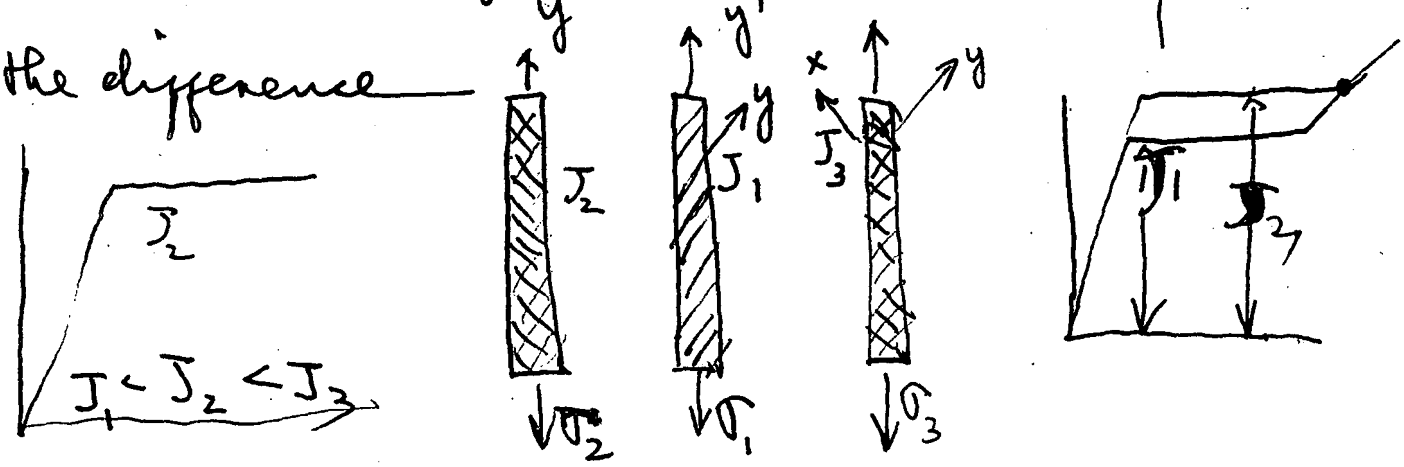
A series of beam test of rectangular beams of different thickness.

Use 

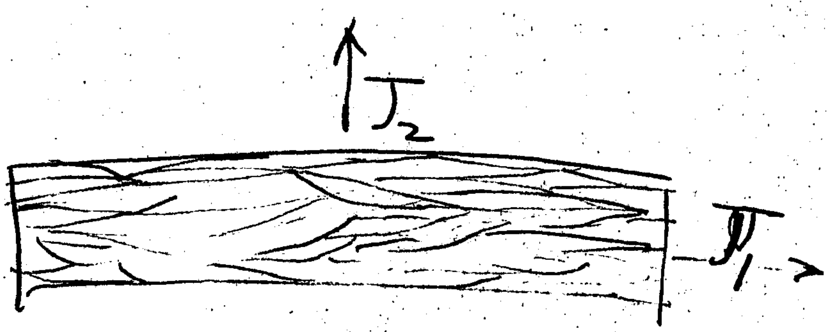
Strain gages.



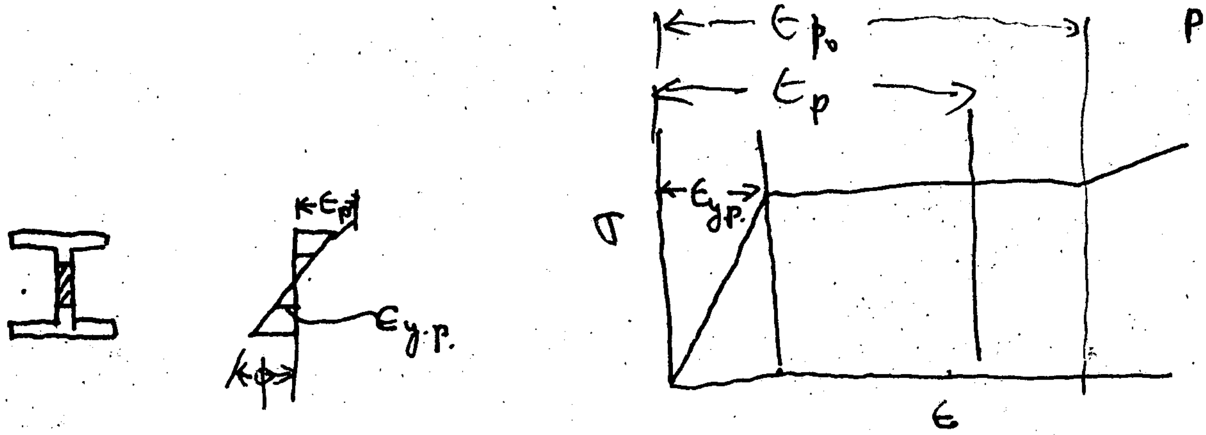
In a rolled section, the grains may be of the above shape. When this is tested in tension or comp. along either x or y direction, the max. shear developed in same sections. They may show the same strength in both directions. But the shearing strength may be different in x & y directions. A tension specimen with white wash, cut along the y' direction may show the difference



Plastic shear with different yielding strength in two perpendicular directions



$$\tau_2 > \tau_1$$



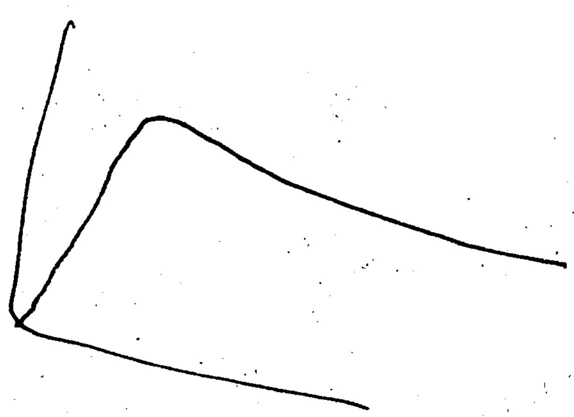
ϵ_p Analytically determined, as function of ϕ.

In actual case ϵ_p is not determined

Plastic strain localized.

This would bring a good point to inelastic buckling problems.

ϵ_{p_0} = 15 to 20 times $\epsilon_{y.p.}$



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1. Shear always started to flow at the corners. But this time it does not see failed by combined stress. Because, the flow lines are perpendicular to each other.

2. M-Φ curves plotted by the gages on web must be compared with the plastic strain on flanges.

3. Plastic strain distribution on a section might ~~be~~ ~~ch~~ change the general idea of inelastic buckling of structural steel

In actual metals there must be a scale effect of plastic flow.

Either of the following tests would show some information of this prob.

① Different thickness plates bend in plastic range

② Short column with initial curvature