Buckling

A Student Design Experiment

Objective

- To find the critical buckling load of an axially loaded mild steel column that is fixed-ended by studying the axial compression vs. lateral displacement plot at the centre.

- To compare the effect of boundary condition (fixed-ended column vs pinended column) on critical buckling load

S2G9

STAGE 2 PRESENTATION

EKNOOR SINGH
DINESH DABI (P)
RUSHIKESH BHOR
BALBIR YADAV

Method

Acquire our testing specimens of appropriate dimensions from the **vendor**

Set up the Universal Testing Machine for use in **Heavy Machinery Lab, CE**

Setting up **LVDT** to measure the lateral **displacement** accurately

Perform buckling, until noticeable **snap-bending** takes place in the specimen

Use **videography** with LVDT readings and set-up for **continous data range**

LVDT

Setting up our specimen for the fixed-fixed boundary condition

Materials and Availability

MATERIAL TO BE USED
Mild Steel

DIMENSIONS OF SPECIMEN
50cm x 10cm x 0.7cm

AVAILABILITY
Available with **Suresh Metals**, 3 such needed
1 for each boundary condition, 1 backup

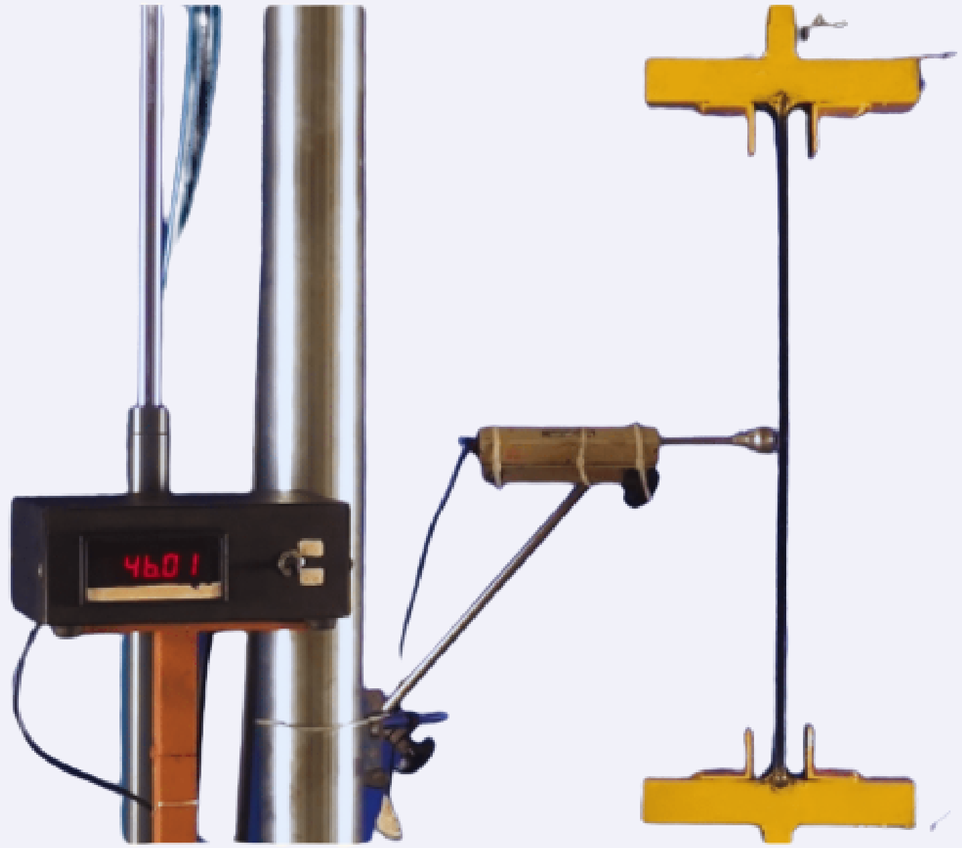
All the above specifications are in accordance with consultations with the lab incharge who has access to the UTM.

Instruments and Access

- **<u>Equipment to be used:</u>**

1. UTM
2. LVDT

- **<u>Permission/ Access:</u>**
- Our team has procured permission to conduct the experiment on the condition that we inform them of the same at least a week in prior so that they could assign us a suitale time.



<u>UTM machine with a fitted LVDT</u>

Data Collection and Analysis

1. **Data Collection:**

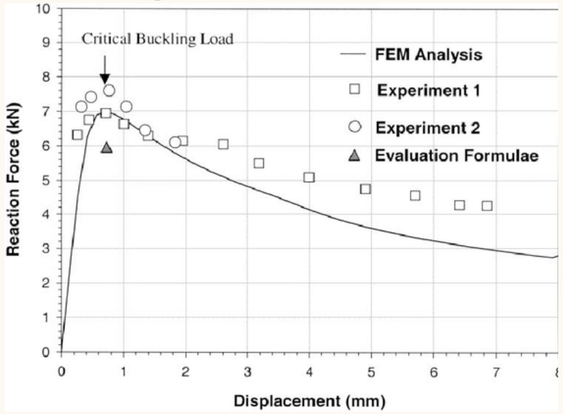
- Applied axial **force data** to be taken from the **UTM**
- Resultant transverse **displacement** to be measured using a **LVDT**

2. **Analysis:**

- Plotting a graph of Axial Force v/s Displacement
- Calculating experimental Critical Buckling Load
- Comparing experimental values with theoretical values

$$P_{cr} = \frac{\pi^2 EI}{L^2}$$

Expected Behaviour



"Looking forward to an enriching learning and experimenting experience"

THANKYOU