ABSTRACT

Buckling analysis is particularly important for axial loaded members because the subjected compressive stress at the point of failure is less than the materials ultimate compressive stress. Buckling analysis is a technique used to determine buckling loads (critical load at which a structure becomes unstable) and buckled mode shapes (the characteristics shapes associated with a structure's buckled response). As a result, special consideration must be given to the critical load when designing axially compressed members. A vertical force was applied on the floor supporting of the slender column top, and the lateral displacement of the column could be calculated through whole structure analysis in design procedure, therefore, the spring stiffness can be figured out through the applied vertical force divided by the displacement. Then, eigenvalue buckling analysis was conducted on the column by using software ANSYS. The finite element analysis includes the effects of residual stresses and geometric imperfections. These are included as a representative single geometric imperfection. This project determines the critical load that causes elastic instability for a fixed-free column of different designs such as circular, square, rectangle, L, C & I- section of 10 meters in length. the axial loaded column is made of structural steel. We will analyse based on buckling simulation for different shapes of the columns to find the maximum load of the column.

Keywords: Euler Buckling, Finite Element Analysis, Columns, Axial Loading, Critical Buckling Load. ANSYS, Euler's theory, lateral deflection.