THE BUCKLING BEHAVIOUR OF STEEL PLATE AS A COLUMN

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SYNOPSIS

The main scope of this project is to study the buckling behaviour of steel plate as a column. We consider the overall buckling for the tested specimens. We study the Modulus of Elasticity (E) of the material related to the lateral displacement (δ) subjected to axial compression load. That is to check the local modulus of elasticity at point where the displacement are being measured, calculated and analysed by computer analysis.

Finite Element Method is known exclusively to solve structural engineering problems. This project uses the package programmes "ANALYSIS SYSTEM" (ANSYS) to compare the lateral displacement of a steel plate column due to an axial compression load during buckling. The comparison from the theoritical and the experimental results will be carried out. The ANSYS programming using eigenvalue (or linear) buckling analysis, which is based on stress-stiffening theory by using element "SHELL 43" will be used to iterate the values of the modulus of elasticity, until the experimental lateral displacement is achieved. The initial of modulus of elasticity used in the ANSYS was taken from the tensile test result.The stresses induced during the buckling condition will be determined at maximum lateral displacement of the steel plate column.

1.0 INTRODUCTION

1.1 General

Structural elements may fail in a variety of ways, depending upon the materials, kinds of loads, and conditions of support. For example, ductile members may stretch or bend excessively if overloaded until at a certain limit the structure will collapse. This flexural members transmit loads through bending action and the stresses induced are tension and compression in nature.

Compression members can thus be viewed as the opposite of tension members in terms of the stresses induced. However the behaviour of compression members is very different to that of tension members. Some of the terms used to describe compression member are columns, struts, posts and stanchions. For the same cross section and material, a compression member can only resist a fraction of the load that a tension member can resist. The reason is because of the different modes of failure.

Failure can be grouped into various types and depend on the nature of the load acting, one causing an extension of the member while the other causing a shortening of the member. The other difference is in the behaviour of the members when subjected to the loads. The most common type of failure for tension member is the yielding of material that is accompanied by large deformations and usually some redistribution of forces within the structure.