OMICS International
conferenceseries.com

J Civil Environ Eng 2015, 5:5
http://dx.doi.org/10.4172/2165-784X.C1.003

World Congress and Exhibition on
Construction & Steel Structure
November 16-18, 2015 Dubai, UAE

Numerical simulation of web crippling behavior of cold formed unlipped channel sections

K Muthulakshmi and **S Seetharaman**
Sathyabama University, India

Cold formed channel sections are susceptible to web crippling under concentrated loads and at support points. The slenderness of the web and the abrupt change in the section from the flange to the web leads to crushing of the section very near to the flange –web interface, which is generally referred to as web crippling. Analytical methods of predicting web crippling strength is very complex due to factors such as imperfections in the web element, local yielding at the point of load application and web instability. The design specifications in North American and Australian codes are based on experiments conducted on slender web sections. The predictions were often unconservative with test strengths found to be as low as 43% of the design strength subjected to Interior Two Flange loading condition. Young and Hancock (2001) have conducted detailed experimental studies on web crippling strength of cold formed unlipped channel sections under four important loading conditions. They have used structural steel having a nominal yield stress of 450 MPa. The specimens have stocky webs and the web slenderness values ranged from 15.3 to 45.0. They have also proposed design strength equations for web crippling that are theoretically and empirically supported. The proposed design strength equations are reliable and they generally predict conservative strength values. Numerical simulation of experimental studies have an important role to play as they enable to conduct the studies numerically thus eliminating the need for carrying out highly expensive and time-taking experimental work. In the present study, web crippling behavior of cold- formed channel sections is simulated using commercially available finite element software. The sections chosen and the experimental details to be simulated are adapted from the studies conducted by Young and Hancock (2001). After the careful simulation studies on two typical sections, predictions are made for several other sections and compared with the experimental results. Attempts will also be made to propose design strength equation for web crippling based on parametric studies.

luck_muthulaks@yahoo.co.in.

A step-by-step liberalized procedure for ultimate analysis of space structure

Wail N Al-Rifaie and **Najla'a H S Al-Asady**
[1]Philadelphia University, Jordan
[2]University of Technology-Baghdad, Iraq

The simplest available theory for predicting the maximum load carrying capacity of steel frames is the simple (or rigid) plastic theory, and test results on adequately stabilized beams and single-story rigid frames have shown quite satisfactory agreement between the observed and predicted maximum loads. As in linear elastic analysis, simple plastic theory also presupposes that deformations have a negligible effect upon the equilibrium equations when formulated for the original unloaded shape of structures. The neglect of deformation moments in simple plastic theory can lead to an over-estimation of frame strength. The agreement between observed and calculated collapse loads in tests on frames of mild steel has been attributed to the compensating action of strain hardening and deformation moments, both of which are ignored in the simple plastic theory. Accepting that, the simple plastic theory for predicting the strength of steel frames has its limitations, the load factor for plastic failure (λp) as determined by this theory is still an important frame parameter and for all structures except the simplest ones, the manual methods for computing (λp) can be tedious and requires, for a rapid solution, a considerable amount of work and intuition concerning the likely mode of failure. Once the generality of the matrix computer methods for linear elastic frame analysis had been recognized, it was natural to expect that attention would be concentrated on the various types of non-linear analysis. The theoretical work presented in this paper is an extension to the method developed by Al-Rifaie and Trikha for the elastic-plastic analysis of plane frame to deal with elastic-plastic analysis of space frame. The method is based on step-by-step linearized procedure based on displacement approach in which the members are assumed to possess infinite rigidity over the size of the connections at their ends for the elastic-plastic analysis of steel frames.

wnrifaie@yahoo.com