# Abstract

The purpose of this work is to predict moment, rotation and connection stiffness of various semi-rigid connections. Top-seat angle with double-web angle connection and double-web angle connection on its own are calculated with different parameter sizes. A procedure is discussed for analysing steel structure with semi-rigid connections. Two methods are outlined for expressing moment, rotation and stiffness in a non dimensional form and for all connections of a given type. The dimensionless relationships are listed for the commonly used structural steel connection types. The two outlined methods are described generally.

Firstly Frye-Morris Polynomial is the method used to determine the constants of the polynomial. Secondly Three Parameter Power model is the method used to determine M-θr relationship for semi-rigid connections for top-seat angle with double-web angle connections and double-web angle connections on its own are developed. The initial elastic stiffness and ultimate moment capacity of the connections are determined by a simple analytical procedure. A least square curve fitting is used to determine the shape parameter with experimental test in Purdue University’s data bank. The initial connection stiffness, ultimate moment capacity and shape parameter are used to obtain a three parameter power model adequate for representing the moment rotation relationships of these connections. A power model is simple to use and provide a realisticl representation of the actual moment-rotation behaviour of each connection type with angles and can be implemented in a second order frame analysis.

In the analysis and design of framed structure, the traditional methods are based on the simplified assumption that the joints are either rigid or pinned. However the experimental investigation shows that the frame connections have an intermediate behaviour between these two extreme cases.

In this project analytical calculations are presented for these two methods and a comparison is drawn between top-seat angle with double-web angle connection and double-web angle connection, using data from two experimental studies by A.A. Azizinamini and W.C. Bell respectively. Tables, figures and data are also included in this dissertation.

It is concluded that the semi-rigid connections for these two types of connections are various in case of moment, rotation and connection stiffness. The percentage variation for top-seat angle with double-web angle connection is one percent varies but for the double-web angle connection are between 1.43 to 2.88 percent vary, this can conclude that these methods are more accurate for top-seat angle with double-web angle connection than double-web angle connection.