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Analytical Modelling of the Moment-Rotation Behavior of Top and Seat Angle Connection with Stiffeners

Authors : Merve Sagiroglu

Abstract : The earthquake-resistant steel structure design is required taking into account the behavior of beam-column connections besides the basic properties of the structure such as material and geometry. Beam-column connections play an important role in the behavior of frame systems. Taking into account the behaviour of connection in analysis and design of steel frames is important due to presenting the actual behavior of frames. So, the behavior of the connections should be well known. The most important force which transmitted by connections in the structural system is the moment. The rotational deformation is customarily expressed as a function of the moment in the connection. So, the moment-rotation curves are the best expression of behaviour of the beam-to-column connections. The designed connections form various moment-rotation curves according to the elements of connection and the shape of placement. The only way to achieve this curve is with real-scale experiments. The experiments of some connections have been carried out partially and are formed in the databank. It has been formed the models using this databank to express the behavior of connection. In this study, theoretical studies have been carried out to model a real behavior of the top and seat angles connections with angles. Two stiffeners in the top and seat angle to increase the stiffness of the connection, and two stiffeners in the beam web to prevent local buckling are used in this beam-to-column connection. Mathematical models have been performed using the database of the beam-to-column connection experiments previously by authors. Using the data of the tests, it has been aimed that analytical expressions have been developed to obtain the moment-rotation curve for the connection details whose test data are not available. The connection has been dimensioned in various shapes and the effect of the dimensions of the connection elements on the behavior has been examined.

Keywords : top and seat angle connection, stiffener, moment-rotation curves, analytical study
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