Behavior and Strength and Stability Design of Steel and Steel-Concrete Composite Columns

Keigo TSUDA

It is important to predict the strength and behavior of beam-columns. Design of slender beam-columns should take the stability effect into consideration, in other words stability design becomes significant. First, circular and square steel tube and concrete filled steel tubular beam-columns are tested under constant vertical and alternating horizontal loads, then the behavior and strength are examined. Secondly it is shown that the buckling loads of steel-concrete composite columns under compressive force can be estimated by using the method of superposed strength, then simple design method for evaluating the buckling strength is proposed. In addition to the strength of columns, design method of slender composite beam-columns is presented by using the superpose strength method.

After the simplified design formula for evaluating an effective length factor of columns in unbraced or braced symmetrical frame is proposed, method of computation of the effective length factor of column in symmetrical frames with bracing is presented. Moreover, required bracing stiffness to give the specified effective length factor of columns is proposed.

The relations between the effective length and bracing stiffness of braced compression members subjected to linear varying axial force are shown, together with required stiffness to ensure the specified effective length factor.