

Structural design procedure of steel structure in Japan

-Seismic design and my recent research activities-

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As same as Eurocode, the design procedure used in Japan considers Service Limit State (SLS) and Ultimate Limit State (ULS). However, due to the limited information provided in English, the design procedure which is used in Japan is not well known. In this lecture, firstly, the history of structural design will be shown. Secondly, the design concepts that are currently used in Japan will be introduced. Finally, the seismic design procedure that is used to guarantee the structure safety will be introduced. Moreover, similarity and difference between Eurocode 8 will be shown.

In the second part, design rule that is used to design the beam-to-column connections will be introduced. Generally, rigid joints are assumed in beam and column; semi-rigid or partial strength joints are not popular in Japan. Several reasons can be found why rigid joints are mostly used, but the main reason is due to the Building Law that will determine the load action. The detail of this background will be also provided. Design concepts and procedures that are used for joint design are explained.

In the third part, column design procedure will be introduced. As it is known, columns are the structural components that are used to support the gravity loads; moreover, columns will resist the horizontal forces in a flexural manner in moment resisting frame system. Under a seismic action, the effect of horizontal forces will be significant; therefore, the column under combined loading will have a possibility to be destabilized. The design requirements that are used to prevent the instability of the column will be shown.

Finally, the recent research topics that are running in my group will be introduced. The topics are about beam joint and steel column. Full-scale testings are conducted to understand the structural behavior; numerical simulations are also used to interpolate the test results. New findings from the research will be also introduced.



Fig. 1. Beam-to-column connection test setup



Fig. 2. Column under combined loading test setup