

Comparison of Allowable Stress Method and Time History Response Analysis for Seismic Design of Buildings

Authors : Sayuri Inoue, Naohiro Nakamura, Tsubasa Hamada

Abstract : The seismic design method of buildings is classified into two types: static design and dynamic design. The static design is a design method that exerts static force as seismic force and is a relatively simple design method created based on the experience of seismic motion in the past 100 years. At present, static design is used for most of the Japanese buildings. Dynamic design mainly refers to the time history response analysis. It is a comparatively difficult design method that input the earthquake motion assumed in the building model and examine the response. Currently, it is only used for skyscrapers and specific buildings. In the present design standard in Japan, it is good to use either the design method of the static design and the dynamic design in the medium and high-rise buildings. However, when actually designing middle and high-rise buildings by two kinds of design methods, the relatively simple static design method satisfies the criteria, but in the case of a little difficult dynamic design method, the criterion isn't often satisfied. This is because the dynamic design method was built with the intention of designing super high-rise buildings. In short, higher safety is required as compared with general buildings, and criteria become stricter. The authors consider applying the dynamic design method to general buildings designed by the static design method so far. The reason is that application of the dynamic design method is reasonable for buildings that are out of the conventional standard structural form such as emphasizing design. For the purpose, it is important to compare the design results when the criteria of both design methods are arranged side by side. In this study, we performed time history response analysis to medium-rise buildings that were actually designed with allowable stress method. Quantitative comparison between static design and dynamic design was conducted, and characteristics of both design methods were examined.

Keywords : buildings, seismic design, allowable stress design, time history response analysis, Japanese seismic code

Conference Title : ICSAUDA 2018 : International Conference on Simulation for Architecture and Urban Design Applications

Conference Location : Bangkok, Thailand

Conference Dates : December 13-14, 2018