

Response Comparison Of Base-Isolated Buildings Under Nankai Trough Earthquakes And Showa-Nankai Earthquakes

Takeshi IKEDA, Atsuko SHIRAYAMA, Tadamichi YAMASHITA, Hiroki OGAWA, Junko KANAI

In this paper, time history response analysis considering the multi-cyclic characteristic of the isolation devices under long-period ground motion is performed using the simplified method and exact method. In addition, time response analysis is performed under different long-period ground motions assuming the Nankai Trough Earthquakes and Showa-Nankai Earthquakes to clarify the response of the superstructure and isolation devices, and attention points for aseismic design are indicated. The analytical model is a five-point equivalent shear linear model, and the maximum response acceleration, maximum response inter-layer displacement, and cumulated absorbed energy of each layer in a base isolated building mainly composed of Lead plug type laminated Rubber Bearings (LRB) or High Damping rubber type laminated Rubber bearings (HDR) are analyzed. As a result, in case of HDR, the characteristic change rate was generally above 0.9 and did not decrease significantly, and there was no difference in response between the simplified and exact methods. In case of LRB, the rate of property change was much lower than that of HDR. As the property change became larger, the simplified method tended to evaluate the deformation to a greater extent. In the LRB adopted in this study, when the cumulative absorbed energy of the seismic isolation layer falls below about 30 MPa, the response difference between the simplified method and Exact method shows variation. There is a fear that the analysis considering the characteristic change cannot be done accurately. In this study, it was found that in the case of HDR, regardless of the input ground motion, the effect of the difference in evaluation method on the response is very small, and therefore, the simplified method can be used to evaluate the response adequately. In the case of LRB, as the characteristic change becomes larger, the response difference between the simplified method and exact method becomes larger, and the analysis accuracy deteriorates. It was also found that the simplified method may have a range of application depending on the amount of cumulated absorbed energy.