Comparative Study of Seismic Isolation as Retrofit Method for Historical Constructions

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Abstract : Seismic isolation can be used as a retrofit method for historical buildings with the advantage that minimum intervention on super-structure is required. However, selection of isolation devices depends on weight and stiffness of upper structure. In this study, two buildings are considered for analyses to evaluate the applicability of this retrofitting methodology. Both buildings are located at Akita prefecture in the north part of Japan. One building is a wooden structure that corresponds to the old council meeting hall of Noshiro city. The second building is a brick masonry structure that was used as house of a foreign mining engineer and it is located at Ani town. Ambient vibration measurements were performed on both buildings to estimate their dynamic characteristics. Then, target period of vibration of isolated systems is selected as 3 seconds is selected to estimate required stiffness of isolation devices. For wooden structure, which is a light construction, it was found that natural rubber isolators in combination with friction bearings are suitable for seismic isolation. In case of masonry building elastomeric isolator can be used for its seismic isolation. Lumped mass systems are used for seismic response analysis and it is verified in both cases that seismic isolation can be used as retrofitting method of historical construction. However, in the case of the light building, most of the weight corresponds to the reinforced concrete slab that is required to install isolation devices.

Keywords : historical building, finite element method, masonry structure, seismic isolation, wooden structure

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