

RECENT RESEARCH ACTIVITIES

New Proposal for Enhancing Seismic Performance of Traditional Wooden House by Using Sheathed Wooden Lattice Walls or/and Built-Up Box-Beams

(Laboratory of Structural Function, RISH, Kyoto University)

Kohei Komatsu, Takuro Mori and Akihisa Kitamori

Even now in Japan, a lot of wooden dwelling houses are not enough in their seismic performances for survivors from devastating earthquake attacks; especially many of traditional wooden houses may have this tendency. It is, however, not always better to let their seismic performance enhanced by subjected to modern reinforcement method rigorously so as to meet with current requirement in Building Bylaw, because modern reinforcement method tends to destroy better features of traditional building style. In order to enhance seismic performance of traditional wooden house with keeping its better features, we proposed a new construction method as shown in Fig.1 by adding not only ① aesthetic sheathed wooden lattice shear wall but also ② built-up beam in upper space or/and ③ under floors, just putting portal frame on the base stones without connecting tightly to reinforced concrete base using anchor bolts. In this construction method, lateral resistance of all structural elements were assumed to be ensured by the friction resistance force which was brought by vertical dead load from such upper layer as heavy roof tiles with mud.

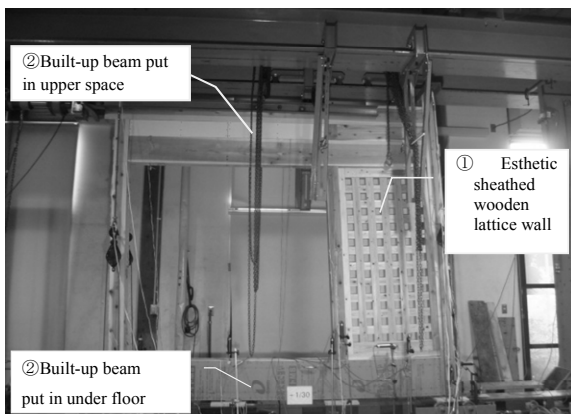


Fig.1 Concept of new seismic reinforcement method

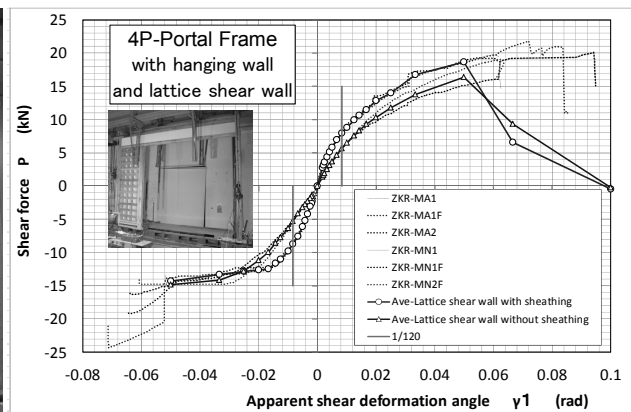


Fig.2 Load-deformation curves

Figure 2 shows typical examples of load-shear deformation angle relationship (envelope curves) of seismic resisting portal frames with hanging wall and wooden lattice shear wall, just putting on the stone base subjected to vertical loads for simulating roof load. By taking these research results into structural design procedure, a traditional wooden house was rebuilt as shown in Figs.3 and 4 in a portion of “Preservation Districts for Groups of Traditional Buildings” of Tondabayshi-City, Osaka prefecture on March in 2012. Our research result could be fruited successfully in an actual wooden house renovation.



Fig.3 Inside view of the house under construction.



Fig.4 Outside view before renovation