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A study on ultimate seismic states of multi-story horizontally mixed structural system and feasibility on connection joints

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This study is concerned with horizontally mixed structure system that an existing old R/C structure is seismically retrofitted by addition of exterior steel frame. This system is suggested as seismic retrofitting method in Japan. Some previous studies related to its seismic response mitigation effects were conducted analytically. This study focuses on ultimate seismic state on its multi-degree of freedom system, and the feasibility study of connection joint between exterior steel frame and existing R/C building is investigated. To determine the design point which estimates the ultimate seismic performance, monolithic load pattern considering seismic load effect is adopted on pushover analysis under structural design procedure. Herein, this composite system consists of two various structural system, and it is assumed that the complicated elasto-plasticity behaviours are presented during inelastic response. So this study suggests the envelope curve model which approximates the inelastic seismic response domain and the load pattern is obtained by reference of this model. From comparison of proposed model and seismic response analysis, the predicted design points are corresponded to each other. Also, it is observed that the predominant failure mode is changed on original and retrofitted state. So this paper suggests the retrofitting strategy which overall failure mode formation is guaranteed. Moreover, the actual connection method between steel frame and R/C building has been suggested. Herein, the required strength is calculated by reference of design points, and ultimate strength of this proposed connection compares with the requirement. From comparisons, it is confirmed that this joint shows sufficient strength.

Biography

Kento Mori graduated from Tokyo University of Science (TUS) in March, and is going for Master's course in TUS from April, 2016.

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