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A study on ultimate state and mechanical characteristics of connection joint of damaged H-shaped bracing structure

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In Japan, various kinds of failure modes in steel structures have been reported in severe earthquake disasters. However, it is guessed that present a few of repair method for these failure modes have some difficulties related to construction technique and estimation of recovery after repair. Herein, from these past reports, this study focuses on the seismic ultimate state of steel brace connection, and the effective restoration method is suggested. In our past researches, new repairing method for damaged steel bracing joint which has angle-section brace member is suggested, and its applicability and feasibility are investigated experimentally. Herein, middle-rise or high-rise steel building structures adopt the H-shaped section brace members, and also, various kinds of failure modes of these bracing structure has been reported after past terrible seismic disasters. So the effective restoration method is proposed here. First, to reproduce the seismic ultimate state, the vertical loading test are performed as parameters with bolt layout, thickness of gusset plate, that is, out-of-plane rigidity. Next, the damaged bracing joints are repaired. Finally, the loading test is done on repaired specimen again. From test results, the restoring force characteristics after repair can be recovered, and any type of failure modes are observed. So 3D model of damaged bracing joint is constructed by using 3D scanner, and it helps to identify the failure mode and yield line on gusset plate. Furthermore, the plastic limit analysis is performed by reference of the 3D model, and it can predict the ultimate state of test results well.

Biography

Yasuto Yonezawa has completed his Bachelor of Engineering degree in 2017. And, he has been a Master's course student of Tokyo University of Science and investigated about repair method for bracing structure. In research activity, he submitted some papers to academic journals of Architectural Institute of Japan.

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