



CYCLIC BEHAVIOR OF A PRESTRESSED CONCRETE BRIDGE COLUMN REPAIRED AFTER EARTHQUAKE DAMAGE

H. Fujioka⁽¹⁾, S. Fujikura⁽²⁾, Y. Saito⁽³⁾, V. Thay⁽⁴⁾

⁽¹⁾ Graduate student, Utsunomiya University, dc227203@s.utsunomiya-u.ac.jp

⁽²⁾ Professor, Utsunomiya University, shuichi.fujikura@a.utsunomiya-u.ac.jp

⁽³⁾ Undergraduate student, Utsunomiya University, r229360@s.utsunomiya-u.ac.jp

⁽⁴⁾ Assistant Professor, Utsunomiya University, vthay@cc.utsunomiya-u.ac.jp

Abstract

To enable rapid post-earthquake recovery of bridge columns, a novel prestressed concrete (PC) bridge column that reduces residual displacement and allows rapid repair of damaged regions has been proposed in the authors' previous study. The objective of this study is to investigate the seismic and recovery performance of a PC bridge column after repair following earthquake damage. For this objective, PC bridge column specimen that had been damaged in previous cyclic loading test was repaired, and cyclic loading test was conducted again.

The test results showed that, in the repaired PC specimen, no significant opening occurred at the interface between the repaired region and the existing concrete. The repaired region and the existing region acted as an integrated member to resist flexural deformation throughout the loading process. Although the maximum horizontal load of the repaired PC specimen was slightly lower than that of the newly constructed PC specimen, the displacement at which load degradation started and the deformation capacity until failure were nearly identical for both specimens. These results indicate that the repaired PC bridge column can achieve seismic performance comparable to that of a newly constructed PC bridge column. Therefore, the proposed PC bridge column structure demonstrates good recoverability and similar seismic performance to the newly constructed PC column considering repair after a major earthquake.

Keywords: post-earthquake repair, prestressed concrete bridge column, recoverability, expanded metal