

Operations Management Strategy of Cable-supported Bridge using Seismic Accelerometer

Seung Han LEE

Manager / Ph.D.

Korea Infrastructure Safety
and Corporation

Jinju, Republic of Korea
shlee@kistec.or.kr

Post Doc, DPRI, Kyoto Univ., Japan
Post Doc, Seoul Nat'l Univ., Korea
Doctor, Seoul Nat'l Univ., Korea

Sung Woo PARK

General Manager / PE

Korea Infrastructure Safety
and Corporation

Jinju, Republic of Korea
sungwoo@kistec.or.kr

Professional Engineer
Ph.D. Candidate, Yonsei Univ., Korea
Master, Yonsei Univ., Korea

Kwang-Yeun PARK

Researcher / Ph.D.

Korea Institute of Civil Engineering
and Building Technology

Goyang, Republic of Korea
kwangyeun.park@gmail.com

Research Prof., Dong-a Univ., Korea
Post Doc, Seoul Nat'l Univ., Korea
Doctor, Seoul Nat'l Univ., Korea

Do-Kyoun KIM

Director / Ph.D.

Korea Infrastructure Safety
and Corporation

Jinju, Republic of Korea
michael@kistec.or.kr

Doctor, Mokpo Nat'l Maritime Univ.,
Korea
Master, Myongji Univ., Korea

Byounghan CHOI

Senior Researcher / Ph.D.

Rural Research Institute of Korea

Ansan, Republic of Korea
han1020@gmail.com

Professor, Myongji Univ., Korea
Post Doc, NC State Univ., USA
Doctor, Chungbuk Nat'l Univ., Korea

Contact: shlee@kistec.or.kr

1 Abstract

This study presents the operations management strategy to respond to earthquake disasters using the acceleration records measured by seismic accelerometers installed on the primary structural elements of cable-supported bridges and those on the free fields around them. A two-step strategy in operations management is proposed for the urgent seismic safety assessment. In the first step, the seismic safety is evaluated with respect to the peak values in recorded acceleration time histories at the locations of the pylon foundation of bridge and the free field around it, and the corresponding management criteria for them are determined based on the existing disaster response manual for offshore bridges. In the second step, the peak values in displacement time histories, which are estimated from the recorded acceleration time histories, are utilized to assess the seismic safety at locations of the top and middle of pylon, and the center of girder of bridge, and the corresponding management criteria are determined based on the structural analyses under the response spectrum seismic loading. When an earthquake occurs, the safety of cable-supported bridge is evaluated urgently through comparisons of peak values in the recorded acceleration time histories and the estimated displacement time histories with the management criteria of accelerations and displacements determined in advance, respectively. The validity of the proposed strategy is verified through performing the safety assessments for several cable-supported bridges on service in Korea using the acceleration data recorded during recent Gyeongju earthquake in Korea.

Keywords: earthquake disaster; operations management strategy; seismic accelerometer; cable-supported bridge; seismic safety assessment; management criteria; response spectrums loading; Gyeongju earthquake.

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