

## **Analysis of a Damage-Control Target Displacement of Reinforced Concrete Bridge Pier for Seismic Design**

**Authors :** Mohd Ritzman Abdul Karim, Zhaohui Huang

**Abstract :** A current focus in seismic engineering practice is the development of seismic design approach that focuses on the performance-based design. Performance-based design aims to design the structures to achieve specified performance based on the damage limit states. This damage limit is more restrictive limit than life safety and needs to be carefully estimated to avoid damage in piers due to failure in transverse reinforcement. In this paper, a different perspective of damage limit states has been explored by integrating two damage control material limit state, concrete and reinforcement by introduced parameters such as expected yield stress of transverse reinforcement where peak tension strain prior to bar buckling is introduced in a recent study. The different perspective of damage limit states with modified yield displacement and the modified plastic-hinge length is used in order to predict damage-control target displacement for reinforced concrete (RC) bridge pier. Three-dimensional (3D) finite element (FE) model has been developed for estimating damage target displacement to validate proposed damage limit states. The result from 3D FE analysis was validated with experimental study found in the literature. The validated model then was applied to predict the damage target displacement for RC bridge pier and to validate the proposed study. The tensile strain on reinforcement and compression on concrete were used to determine the predicted damage target displacement and compared with the proposed study. The result shows that the proposed damage limit states were efficient in predicting damage-control target displacement consistent with FE simulations.

**Keywords :** damage-control target displacement, damage limit states, reinforced concrete bridge pier, yield displacement

**Conference Title :** ICAERS 2019 : International Conference on Advanced Earthquake Resistant Structures

**Conference Location :** Dublin, Ireland

**Conference Dates :** April 25-26, 2019