Nonlinear Analysis of Prestressed Knee-Joint under Seismic Loads

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ABSTRACT

Given that there is a lack of nonlinear analysis of knee-joint type elements, in this study, sophisticated nonlinear analysis is conducted. Using OpenSees, reinforced concrete knee joint models with various design conditions are analyzed under the lateral seismic loads. In order to simulate the backbone and strength deterioration, Ibarra-Medina-Krawinkler (IMK) model is used in nonlinear analysis. Verification of the modeling is carried out by comparison with previous data from a variety of RC knee-joint experimental models.

1. INTRODUCTION

In 2002, Joint ACI-ASCE Committee 352 reported the ACI 352R-02, the recommendations for design of beam-column connections of reinforced concrete (Joint ACI-ASCE Committee 352 2002). However, the recommendations have deficient information about post-tensioned knee joints. In reality, the recommendations pointed out that a post-tensioned joint is still open to be researched in its appendix. In addition, nonlinear analysis of post-tensioned knee joint has not been performed sufficiently to date. Thus, in this study, nonlinear analysis for various post-tensioned knee joints is carried out using the OpenSees. Comparing with the experimental data, the credibility of the nonlinear analytical model is checked.

2. EXPERIMENTAL MODEL

For verification of the nonlinear analysis, previous experimental specimens were inspected first. For this study, three different knee-joint specimens (K-PT-N-1, 2, 3) were used for nonlinear analysis (Kwon 2016). Each specimen had the same cross

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