Using Superposition Method for Evaluation of Stress and crack Distribution in Base Plate and Foundation under Bidirectional Moments Using Nonlinear Analyses

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Abstract

Base Plates transfer all forces and moments to the foundation. The building codes and design handbooks generally illustrate the axial loading along with one-way small moments for the design of column base connections. While, the only accurate method for design of these critical connections is finite element modelling. This method is highly complicated because of multiplicity and variations of the base plate types in the buildings. Actually, there are many problems for the modelling and analysis of base plates under various load combinations. In this paper, the superposition method used for the design of base plates under small biaxial moments and the results are compared with the results obtained from pushover analyses in ANSYS software. The results show that superposition method can be used for the analysis of base plates under small biaxial moments. In addition, using stiffeners increases the stress under the base plates up to 5 percent in finite element method in compare with base plates without stiffeners. Also, the difference between superposition and finite element methods for base plates with and without stiffeners differs up to 6 and 13 percent, respectively.

Keywords:
Base plate, Bidirectional Moments, Nonlinear analysis, Superposition, Crack.

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