8th. World Congress on Computational Mechanics (WCCM8)
5th. European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)
June 30 – July 5, 2008
Venice, Italy

Ultimate Resisting Capacity of Slender RC Columns Subject to Long-term Biaxial Bending

***Hyo-Gyoung Kwak[1], Ji-Hyun Kwak [2]**

[1] Department of Civil Engineering. Korea Advanced Institute of Science and Technology Guseong 373-1, Yuseong, Daejeon, South Korea
khg@kaist.ac.kr

[2] Department of Civil Engineering. Korea Advanced Institute of Science and Technology Guseong 373-1, Yuseong, Daejeon, South Korea
zethor@kaist.ac.kr

Key Words: *Reinforced Concrete Column, Ultimate Resisting Capacity, Biaxial bending, Long-term behaviour.*

ABSTRACT

Ultimate resisting capacity of slender reinforced concrete (RC) columns subject to combined axial loads and biaxial bending is evaluated on the basis of nonlinear analyses. Geometric nonlinearity and long-term behavior of concrete as well as the material nonlinearities by cracking of concrete and yielding of steel are considered, and the biaxial stress state of a RC section is simulated by using the fiber model.

Since the failure surface of a RC column subject to biaxial bending can be approximated by the load contour method, proposed by Bresler[3], which represents the reduction rates of resisting capacity in a biaxial behavior to a uniaxial behavior on a P-M interaction diagram, the corresponding variable of an exponent alpha is designed in this paper, in terms of related design variables such as slenderness ratio, eccentricity, section geometry, and creep coefficient on the basis of the obtained numerical analysis results.

The relationship between the alpha and design variables is established from regression and used to determine the ultimate resisting capacity of slender RC columns subject to long-term biaxial bending without any rigorous numerical analyses. The ultimate resisting capacities calculated from the regression formula are compared with those obtained from rigorous nonlinear analyses and from the ACI formula with the objective of establishing the relative efficiency of the proposed regression formula.

REFERENCES

[1] ACI Committee 318, Building Code Requirements for Reinforced Concrete (ACI 318–89), American Concrete Institute, Detroit, 1989

[2] Kwak. H.G. and Kim J. K.,"Ultimate Resisting Capacity of Slender RC Columns,", Computers and Structures, Vol. 82, No.11-12, pp. 901-915, 2004

[3] Bresler, "Design Criteria for Reinforced Columns under Axial load and Biaxial bending", ACI Journal Proceedings, Vol. 57, Issue 11, pp.481-490, 1960