

Computer Program to Analyze Any Arbitrary Shape of Concrete Column Sections Subjected to Biaxial Bending and Axial Load

H. EL-Ghazaly 1, A. EL-Sayed 2, M. Abou ELmaaty 2, M.Fahim 3

Civil Engineering Research Magazine –CERM - Faculty of Engineering – Al-Azhar University. April 2004

Abstract :

New technique for calculating the uniaxial and biaxial interaction diagrams of concrete column by using computer program is presented. This technique deals with any orientation of the neutral axis for different shapes of column sections subjected to biaxial bending and axial load. The program developed is based on the assumption that plane sections remain plane after the application of loads. Double integrations method is used, through the program, to get the closed form of M_{nx} , M_{ny} , and P , with nonlinear stress-strain relationship of concrete and steel material. The geometry of the section may take the shape of ellipse, circle or any arbitrary shape which may contains an arc of a circle. The program divides any arc to number of lines, each line corresponding to each one degree of the arc angle. The program allows the designer to evaluate uniaxial and biaxial interaction diagram of concrete column under compression or tension.

A numerical example is presented in detail to verify the effectiveness of the proposed computer program in comparison with one of the commercial program PC-Column. The results show good agreement between the proposed computer program and the available commercial program.