

14. Structural Performance and Strength Estimation of Precast Concrete Shell R/C Columns Using High Strength Materials

Hiroshi Hosoya, Yasuhiro Oka,
Kunio Hayakawa, Satoshi Yamagami

Recently, high strength materials have been used in the columns of high-rise buildings. To examine structural performance and estimation method of maximum strength of R/C column using precast concrete shell (PCa column) in which concrete strength (F_c) was 100N/mm² class, main reinforcement strength (F_y) was 685N/mm² class, and lateral reinforcement strengths (F_y) were 785 and 1275N/mm² class, loading tests of PCa columns were carried out. Test results can be summarized as follows:

- (1) Within these experimental specimens, there is a correlation between deformation capacity (R_u) and the ratio of amount of lateral reinforcement ($p_w \sigma_{wy}$). R_u can be evaluated in equation (1).
- (2) Though the calculated value of flexural strength of PCa column by the ACI equation was greater than experimental value in some cases, the calculated value of flexural strength by the NZ equation can safely estimate the strength.
- (3) The shear strength equation of "Design guideline for earthquake resistant reinforced concrete building based on inelastic displacement concept" can safely estimate shear strength of PCa column, but only if effective concrete strength coefficient derived from CEB equation of effective concrete strength and effective yield strength of lateral reinforcement derived from equation (2) based on the effective yield strength equation of New RC design guideline were used.

Key words : reinforced concrete, R/C column using precast concrete shell, high strength material, structural performance, strength estimatio