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Report on Equivalent Rectangular Concrete Stress Block and Transverse Reinforcement for High-Strength Concrete Columns

Reported by Joint ACI-ASCE Committee 441

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This report provides a research summary of equivalent rectangular concrete compressive stress blocks and transverse reinforcement design requirements for high-strength concrete (HSC) columns. Because ACI 318 code provisions for column design are mostly based on concrete strengths less than 10,000 psi (70 MPa), the use of equivalent rectangular concrete stress block factors given in the code has been questioned. As a result, many alternative expressions have been developed. This report provides a summary of various suggestions of equivalent rectangular concrete stress block and design guidelines for HSC columns.

The report also provides highlights of the research on the performance of HSC columns under various loading conditions, including monotonically increasing concentric or eccentric compression, and load reversals with increasing deformation and constant axial compression. The behavior of HSC columns subjected to combined axial load and bending moment is discussed. Various proposals for determining the amount and details of transverse reinforcement for seismic design are also reviewed.

Keywords: axial load; bending moment; columns; concrete stress block; ductility; flexural strength; high-strength concrete; longitudinal reinforcement; seismic design; transverse reinforcement.

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