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SERI KIATYUTTACHAT : A STUDY TO PROPOSE DESIGN GUIDE FOR HIGH-STRENGTH CONCRETE MEMBERS. THESIS ADVISOR : PROF. EKASIT LIMSUWAN, Ph.d., 205 pp. ISBN 974-584-631-7

High strength concrete is increasing use in reinforced concrete construction, due to great advantages in mechanical properties toward structural behaviors. In current codes, several parameters in structural design are not governed and may not be sufficient accurate, especially when concrete strength higher than 550 kgs/cm^2. In this study, stress-strain relationship of high strength concrete has been proposed from analytical and experimental data obtained from various sourses. It has covered larger ranges both for normal and high strength concrete. Thus stress-strain relationship may accurately calculate or predict the behavior in ultimate limit states and serviceability limit states. For strengths; flexure, shear, compression, and development length are considered. For serviceability; deflection and cracks have been studied.

Stress-strain relationship for high strength concrete proposed in this study indicates some diviation from one for normal strength concrete. The peak strain increases with its strength but the ultimate strain seems to be constant at about 0.003. The curve proposed in this paper has adopted from the Hognestad's distribution to suite the peak strain. It can be used for calculation or prediction of structural strength or ductility, respectively. For flexural member, proposed concrete stess distribution can accurately predict flexural strength and ductility to satisfactory result when compared to experimental data. The amount to steel reinforcement may be limitted to 0.375 of the one at balanced condition, to obtain resonable ductility to produce plastic hinge. In the same manner minimum steel of the section has been proposed. For shear strength, two equations have been proposed to conform with the test results considering flexural reinforcement, and shear span, repectively. Web reinforcement can be calculated accurately by truss analogy. For compression members such as columns, the ultimate stress ratio has found to be varied with concrete strength and conformed to the confinement effects. Development of reinforcing bar is also proposed on the basis of behavior and experimental result of splice bars in beam with constant moment. It may be accurately calculated to confirm with the test results at lower variance and has shown slightly conservatie prediction when compared to the ACI 318-89.