



EXPERIMENTAL VERIFICATION OF STRUT AND TIE METHOD FOR REINFORCED CONCRETE DEEP BEAMS UNDER VARIOUS TYPES OF LOADINGS

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Abstract: Strut-and-tie method (STM) is a very useful tool to design the irregular concrete members. This work presents the results of the experimental tests conducted on three self-compacting reinforced concrete deep beams that had a constant cross section of 150 mm×400 mm and a total length of 1400 mm. The beams were subjected to 1-concentrated force, 2-concentrated forces and uniformly distributed load. Each test beam was analyzed by using the STM that presented by ACI 318M-14 provisions. The cracking load, failure load, deflection, crack pattern, crack width, steel reinforcement strains, concrete surface average strains and modes of failure for the tested beams were observed, recorded and discussed. The experimental results were compared with the STM results. Test results indicated that each beam carried loads greater than the STM design load. In other words, results showed that the STM is conservative that gives the designers wide flexibility. More specifically, in case of central single concentrated force, STM predicted ultimate load was less than the experimental one by 19.2%. While STM predicted ultimate load was less than the experimental one by 20.4% in the cases of two central concentrated forces and uniformly distributed load.