ABSTRACT

Shear and Flexural Behavior of Wide Beams Strengthening With CFRP for Different Details of Reinforcement

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The behavior of 13 wide RC beams strengthened with CFRP in flexural and shear with different details of reinforcement has been studied. All beams tested as simply supported beams, under two point loads, and with normal concrete strength (30MPa). The tested beams were divided into four main groups; group one consisted of 4 wide RC beams: one of these beams was un-strengthened beam (control beam) and the other three beams strengthened with CFRP in flexural zone with different width (30%b), (60%b) and (100%b), group two consists of 5 wide RC beams: one of these beams was un-strengthened beam (control beam), the other beams in this group were strengthened with CFRP in the sides of beam, U-shape, discontinues L-shape and beam designed with maximum steel ratio ($\rho_{max.}$), group three consisted of 2 beams strengthened with vertical and inclined fully wrapped strip CFRP but without stirrups, and group four consisted of 2 un-strengthened beams with vertical and inclined shear reinforcement designed with shear reinforcement spacing (S) instead of (d/2) limitation of the ACI-Code ($S_{Max.}$) (Table 9.7.6.2.2). The analysis system (ANSYS 12) program was used to modeling the RC beams. This study demonstrated that the possibility of using the strengthened beam (60%b) instead of strengthened beam (100%b). The strengthened beam with discontinues L-shape gave the best results compared to other strengthened beams in groupp two. The results showed also the possibility of using externally bonded CFRP sheet in the shear zone instead of using shear reinforcement. From

the experimental tested results and numerical results which done by ANSYS program showed that there is no significant difference in the experimental and numerical results when using the shear spacing (d) instead of (d/2) since the difference is imperceptible in both cases, so it is used (d) instead of (d/2) when the shear spacing (S) from the design equations is larger than maximum shear spacing ($S_{max.}$) in the ACI-Code, because the limitation (d/2) is dominated in the maximum shear limitation ($S_{max.}$), the using of shear spacing (d) instead of (d/2) will provide the rebar in economic terms, and the time needed for the work of these beams, as well as to limit the congestion of rebar. And there was a convergence of the results of the ANSYS program and the experimental results by the range of (83-96 %).