

عنوان مقاله:

Using NSM Method in R/C Beams Strengthening by FRP Strips

محل انتشار:

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خلاصه مقاله:

Reinforced concrete flexural elements may be required to strengthen during their service life due to various reasons, e.g. defect or decay in mechanical materials properties, imperfections on construction, or increasing of design loads due to changing in utilization or rules of the codes. Various FRP products – as composite materials- are recently used in different technique to strengthen the structural elements. In a very newest technique, which is called Near-Surface-Mounted (NSM) method, the FRP strips (or rods) are laid down on the epoxy filled grooves which already created on the external surfaces (top or bottom) of the concrete beams or slabs. Compare to the traditional use of FRP sheets adhering to the external surfaces, this method cause better transferring of the loads to the surrounding concrete by enhancing the bonding stresses, as well as better protecting the mechanical properties of the FRP strips against any environmental defects. In this study, behavior of nine reinforced concrete beams (in three groups of different reinforcing ratios) which already strengthened by FRP strips (by NSM method), were simulated numerically by Finite Element Method. The numerical results were compared to the experimental ones. Results show impressive compatibility between the numerical and the experimental load-displacement curves from the initial stage of loading, up to the peak load and further down to total strength degradation. Crack pattern and deformation, and also the failure process, all reproduced in a good and reasonable estimate of the experimental results. Increase in strength along with decrease in ductility was shown by both results. Strength and stiffness of all the strengthened beams (by FRP strips) were higher compare to the control beams (with no FRP), the same as observed in the experiments. Also, it shown that for the specimens with higher reinforcements, increase in CFRP strips resulted lower efficiency in strength, the same trend in the experiments.

کلمات کلیدی:

NSM method, FRP composite material, R/C beams, Finite Element Modelling

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