بحث رقم (٤)

عنوان البحث (باللغة التى نشر بها) :

Using Ultra-High Performance Fiber Reinforced Concrete in Improvement Shear Strength of Reinforced Concrete Beams

مكان النشر (بلغة مكان النشر): **Case Studies in Construction Materials - Elsevier B.V.**
Impact factor 4.934
تاريخ الإرسال للنشر : ٢٠٢١/١٢/٤، تاريخ القبول للنشر : ٢٠٢٢/٣/١١ ، تاريخ النشر : ٢٠٢٢/٣/١٥

Shear failure of RC beams is one of the major problem in the construction industry today. It is desirable that the beam fails in flexure rather than in shear because the shear failure is catastrophic and occurs usually without advance warning. The aim of this paper is to evaluate the effectiveness of using ultra-high performance fiber reinforced concrete (UHPFRC) as a strengthening technique to improve the shear strength of RC beams. For this purpose, twelve RC beams were cast and tested under a four-point loading test up to failure. One beam was kept as a control beam without strengthening, and the other eleven beams were strengthened using different strengthening schemes. The main parameters considered in this experimental work were the thickness of the UHPFRC layer, the number of strengthening sides, the volume fraction of steel fibers, distribution length of UHPFRC layers (strengthening entire length, strengthening one-third of the length, strengthening using vertical and inclined strips), and strengthening schemes (casting or anchoring system). The experimental results revealed that UHPFRC is an effective technique in strengthening the RC beams in shear, as the behaviour of strengthened beams was improved in terms of ultimate shear strength up to 1.54 times, initial stiffness up to 2.75 times, ductility up to 3.37 times, and toughness up to 4.77 when compared to the un-strengthened beam. Furthermore, most of the strengthened beams failed in a ductile manner by forming flexural cracks in the maximum moment zone. In particular, the full casting of the UHPFRC strengthening scheme was more efficient than the UHPFRC laminates in improving the shear strength of tested beams. Roughening the beam surface improved the bond between the beam surface and the UHPFRC. Moreover, strengthening the beams by vertical or inclined strips had a substantial contribution in increasing shear capacity.