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Flexural Behavior of Stainless-Steel Wire Mesh Strengthened Reinforced Concrete Beam

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Abstract

Strengthening the existing concrete structure has attracted great attention to prevent reconstruction and preserve natural resources. Advanced composite materials are often employed for strengthening concrete structures to meet changes in serviceability characteristics, refined analysis, and design philosophies. Among the various options, Stainless Steel Wire Mesh (SSWM) can potentially be suitable for strengthening Reinforced Concrete (RC) structural elements. The present experimental study demonstrates the effectiveness of Stainless-Steel Wire Mesh as a strengthening material for RC beams under flexural load. Eight RC beam specimens of M25 grade concrete are prepared. The cross-section of the rectangular RC beam specimen is 150 mm wide and 250 mm deep. The length of all the specimens is 1200 mm. The RC beam is reinforced with 2 – 10mm diameter longitudinal bars in the compression zone and 2 – 10 mm diameter longitudinal bars in the tension zone. In addition, 2-legged 8 mm diameter stirrups at 150 mm c/c spacing are provided in the transverse direction. Two RC beams are designated as control specimens, and six beams are strengthened using SSWM with three different wrapping configurations. The specimens are tested under four-point bending to study the flexural effectiveness of the proposed wrapping configuration of SSWM. The flexural load and deflection at the first crack and ultimate stages, load-deflection behaviour and failure mode of SSWM strengthened specimens are compared with that of control specimens. The results show a 77.7 % increase in ultimate load, corresponding deflection and improved failure behaviour of the fully wrapped RC beam compared to the control beam specimen.

KEYWORDS: Reinforced Concrete, Flexural strength, Stainless Steel Wire Mesh, Fibre-reinforced polymer.

CATEGORY: Structural Engineering