Wire rope flexural bonded strengthening system on rc-beams: A finite element simulation

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Abstrak

We conducted a finite element simulation by using a computer program, ATENA, to verify the behavior of T-section reinforced concrete beams strengthened by bonded wire ropes in the negative moment region with a pretensioned initial prestressing force; we compared this behavior with that in experimental tests. The simulation was performed on five models consisting of one unstrengthened beam and beams strengthened by wire ropes with initial prestressing forces of 0%, 10%, 20%, and 30%. We found that the capacity of a flexural load had the ratios to the experimental results close to 1 — that is, 1.25, 1.16, 1.12, 1.01, and 1.10, for UB, SB1, SB2, SB3, and SB4, respectively. The ratios of effective stiffness, as the result of the simulation, to the experimental results were 1.45, 1.08, 1.76, 2.13, and 2.46 for UB, SB1, SB2, SB3, and SB4, respectively. We also observed that crack propagation developed in the finite element simulation indicated that all models underwent flexural failure.