

Behaviour of Waste Plastic Fiber Concrete Slabs Under Low Velocity Impact

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Abstract

This research investigates the impact resistance of concrete slabs with different volume percentage replacement ratios of waste plastic fibers (originally made from soft drink bottles) as follows : 0.5%, 1% and 1.5%. Reference mix produced in order to compare the result. For the selected mixes, cubes with (100×100×100mm) were made to test compressive strength at age of (90) days. Flexural strength (Modulus of Rupture) test was also conducted using prisms sample of (500*100*100 mm) dimensions. The low-velocity impact test was conducted by the method of repeated falling mass where 1400gm steel ball was used. The ball falling freely from height of 2400mm on concrete panels of (500×500×50 mm) having a mesh of waste plastic fiber. The number of blows that caused first crack and final crack (failure) were determined, according to the former obtained results , the total energy was calculated. Results showed an improvement in mechanical properties for mixes containing plastic fibers compared with reference mix. For compressive strength the maximum increase in compressive strength was equal to (3.2%) at age of (90) days. Flexural strengths for mixes containing plastic fiber at ages 28, and 90 days are higher than that of these of reference mix. The maximum value of increaseing was (18%) for 28 days age of test and it was equal to (26%) for 90 days age of test for the mixture with plastic fiber content by volume equal to (1%) . Results showed a significant improvement in low-velocity impact resistance of all mixes contining waste plastic fibers when comparing with reference mix. Results illustrated that mix with (1.5%) waste plastic fibers by volume give the higher impact resistance at failure than the others. The magnitude of an increase over reference mix was equal to (340%).