

Behavior of Reinforced Concrete Beam Using Waste Plastic Bottle (PET) Fibers and Recycled Coarse Aggregate

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The basis for this research was to investigate the effects of using recycled materials, in varying amounts, on the fresh and hardened concrete properties. The recycled materials used in this study consisted of Waste Plastic Bottle (PET) Fibers and Recycled Coarse Aggregate. Percentage of the waste PET bottles 0, 1, 2, 3% and recycled coarse aggregate (crashed concrete) 0, 100% from natural coarse aggregate. Fifteen reinforced concrete beams specimens of dimensions (250×120×2000 mm) were prepared in the current research, and divided into five main groups of three beams each, based on % recycled fiber, % recycled concrete coarse aggregate (RCA) and reinforcement steel details (BC, BS, BF). All the specimens of the experimental work were casted and strengthened at concrete research and Material Properties Laboratory, "Faculty of Engineering, Fayoum University". Casting and curing were done according to the Egyptian Code of Practice (2016). The results of the experiments indicated that the use of RCA decrease slump of concrete and this drop of slump was increased by adding PET fiber. the maximum decrease in slump was occurred by adding 3% of PET fiber. the compressive strength was decreased by replacing neutral coarse aggregate with recycled coarse aggregate while the compressive strength increased by adding PET fiber and the optimum increased was occurred by adding 1% of PET fiber. The tensile and flexural strength were decrease also by using RCA and when adding PET fiber, the tensile and flexure strength were increased. The best enhancement of both tensile and flexural strength was at using 3% PET fiber. It was found that using PET fiber enhance the ductility ratio, maximum loading capacity, initial stiffness and toughness of concrete beams. the degree of the enhancement depends on fiber ratio.

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