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Studying the Effect of Additives to Improve the Properties of Concrete Produced Using Recycled Aggregates (RCA) and Stress-Strain Curve for it.

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Abstract

This research deals with an experimental study on the effect of using recycled aggregates (coarse - fine - coarse + fine) from demolished buildings as a substitute for natural aggregates with different replacement ratios (25-50-75-100) on the properties of concrete mixture and hardened concrete using additives (silica dust and suitable plasticizer).

Cubic samples consisting of natural and recycled aggregates were tested.

Standard cylindrical samples were tested to draw a (stress-strain) curve for concrete produced with recycled aggregates with the previous replacement ratios for aggregates.

This work aims to study the effect of replacing recycled aggregates on the properties of concrete mixture and to draw a stress-strain curve that gives an idea of the element's behavior in all stages of its work.

Where cement with a caliber of 400 Kg/m³, silica fume at a rate of 8%, and plasticizer at a rate of 1.5% were used.

The results showed a significant improvement in concrete resistance using additives for recycled aggregates, as it is possible to use rounded aggregates up to 100%, and at this replacement ratio, a resistance of (30-29-22) MPa can be obtained for (coarse and fine - coarse - fine) aggregates respectively, while at a replacement ratio of 25% recycled aggregates and 75% natural aggregates, a resistance of (40-34-29) MPa can be obtained for (coarse and fine - coarse - fine) aggregates respectively. The results showed that the (stress-strain) curve remains the same with a decrease in the peak and the strain is greater in the descending branch when the replacement ratio increases.