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Effect of span-to-depth ratio on the flexural behavior of reinforced super crete beams cast with recycled fine aggregate

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A judicious use of resources, by using by-products and waste materials, and a lower environmental impact, by reducing carbon dioxide emission and virgin aggregate extraction, allow approaching sustainable building development. Recycled aggregate concrete (RAC) containing supplementary cementitious material (SCM), if satisfactory concrete properties are achieved, can be an example of such sustainable construction materials. Fine recycled aggregates are seen as the last choice in recycling for concrete production. Many references quote their detrimental influence on the most important characteristics of concrete; compressive and tensile strength; modulus of elasticity; water absorption; shrinkage; carbonation and chloride penetration. These two last characteristics are fundamental in terms of the long-term durability or reinforced concrete. This paper deals with the short-term deflection of reinforced super Crete beams made of sea-sand as recycled fine aggregate (RFA). Experimental work was carried out to investigate the effects of tension & compression reinforcement ratios and span- to-depth ratio on the short-term deflection. Based on the experimental results of the tested specimens, the present study shows that the sea-sand as recycled fine aggregate (RFA) can be successfully used as a construction material for flexural members subjected to different types of loading provided that adding an organic polymer to the mixing water to limit the Cl- and SO3 content and to control the pH value up to the specified limit according to the Egyptian code. The test results showed also that the maximum deflection of the test specimens decreases with the increase of the reinforcement ratio. On the other hand, the deflection increases with the increase in span-to-depth ratio. This paper presents the main results of this research, drawing some conclusions on the feasibility of using this type of aggregate in structural concrete, while taking into account any ensuing obvious positive environmental impact.

Keywords: Beams; Flexural Behavior; Recycled Fine Aggregate (RFA); Span/Depth Ratio; Super Crete.

Biography

Salah Abdel-Gawad Aly is a highly esteemed professor specializing in reinforced concrete structures, with a wealth of experience and expertise in his field. He has made significant contributions to the advancement of construction and engineering practices throughout his career. Currently serving as a professor at the Housing & Building National Research Center (HPNRC) in Cairo, Egypt, Salah Abdel-Gawad Aly has dedicated his life to teaching, research, and the development of innovative solutions for the construction industry.

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