

Effects of Incorporating Recycled Brick and Stone Aggregate as Replacement of Natural Stone Aggregate in Concrete

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Abstract

This paper presents an experimental research on the mechanical properties of concrete made from recycled and virgin coarse aggregates. Two types of recycled coarse aggregate (RCA) i.e. recycled brick aggregate (RBA) and recycled stone aggregate (RSA) were used in combination with natural stone aggregate (NSA). This study aims to investigate the feasibility of using recycled materials in concrete by focusing on the fracture mechanism of the specimens. For this purpose, sixty-six cylindrical specimens and thirty-three prismatic specimens were cast using 0, 10, 20, 30, 40 and 100% RBA and RSA as a replacement of NSA with different absolute water/cement (w/c) ratio. The test results show that the compressive, flexural and splitting strengths of concrete made from RSA were greater than those of RBA. Besides, concrete contains RSA has the lower strengths fall than that of concrete contains RBA in each percentage of recycled aggregate. The RSA concrete showed combined failure of concrete; on the contrary, aggregate failure which is not acceptable for good quality concrete has been observed in RBA concrete. Therefore, the use of RBA with NSA is not appropriate to produce good quality concrete, but replacing NSA with up to 30% of RSA can be effectively used.

Keywords: recycled brick aggregate, recycled stone aggregate, fracture mechanism, absolute w/c ratio

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