To Optimise the Mechanical Properties of Structural Concrete by Partial Replacement of Natural Aggregates by Glass Aggregates

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Abstract : Glass from varying recycling processes is considered a material that can be used as aggregate. Waste glass is available from different sources and has been used in the construction industry over the last decades. This current study aims to use recycled glass as a partial replacement for conventional aggregate materials. The experimental programme was designed to optimise the mechanical properties of structural concrete made with recycled glass aggregates (GA). NA (natural aggregates) was partially substituted by GA in a mix design of concrete of 30N/mm2 in proportions of 10%, 20%, and 25% 30%, 40%, and 50%. It was found that with an increasing proportion of GA, there is a decline in compressive strength. The optimum percentage replacement of NA by GA is 25%. The heat of hydration was also investigated with thermocouples placed in the concrete. This revealed an early acceleration of hydration heat in glass concrete, resulting from the thermal properties of glass. The gain in the heat of hydration and the better bonding of glass aggregates together with the pozzolanic activity of the finest glass particles caused the concrete to develop early age and long-term strength higher than that of control concrete

Keywords : concrete, compressive strength, glass aggregates, heat of hydration, pozzolanic

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