

Study of the Performances of an Environmental Concrete Based on Recycled Aggregates and Marble Waste Fillers Addition

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Abstract : The needs of the construction sector still increasing for concrete. However, the shortage of natural resources of aggregate could be a problem for the concrete industry, in addition to the negative impact on the environment due to the demolition wastes. Recycling aggregate from construction and demolition (C&D) waste presents a major interest for users and researchers of concrete since this constituent can occupies more than 70% of concrete volume. The aim of the study here in is to assess the effect of sulfate resistant cement combined with the local mineral addition of marble waste fillers on the mechanical behavior of a recycled aggregate concrete (RAC). Physical and mechanical properties of RAC including the density, the flexural and the compressive strength were studied. The non destructive test methods (pulse-velocity, rebound hammer) were performed . The results obtained were compared to crushed aggregate concrete (CAC) using the normal compressive testing machine test method. The optimal content of 5% marble fillers showed an improvement for both used test methods (compression, flexion and NDT). Non-destructive methods (ultrasonic and rebound hammer test) can be used to assess the strength of RAC, but a correction coefficient is required to obtain a similar value to the compressive strength given by the compression tests. The study emphasizes that these waste materials can be successfully and economically utilized as additional inert filler in RAC formulation within similar performances compared to a conventional concrete.

Keywords : marble waste fillers, mechanical strength, natural aggregate, non-destructive testing (NDT), recycled aggregate concrete

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