Risk of Plastic Shrinkage Cracking in Recycled Aggregate Concrete

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Abstract : The intensive use of natural aggregates, near cities and towns, associated to the increase of the global population, leads to its depletion and increases the transport distances. The uncontrolled deposition of construction and demolition waste in landfills and city outskirts, causes pollution and takes up space. The use of recycled aggregates in concrete preparation would contribute to mitigate the problem. However, it arises the problem that the high water absorption of recycled aggregate decreases the bleeding rate of concrete, and when this gets lower than the evaporation rate, plastic shrinkage cracking occurs. This phenomenon can be particularly problematic in hot and windy curing environments. Cracking facilitates the flow of liquid and gas into concrete which attacks the reinforcement and degrades the concrete. These factors reduce the durability of concrete structures and consequently the lifetime of buildings. A ring test was used, cured in a wind tunnel, to evaluate the plastic shrinkage cracking sensitivity of recycled aggregate concrete, in order to implement preventive means to control this phenomenon. The role of several aggregate properties on the concrete segregation and cracking mechanisms were also discussed.

Keywords : recycled aggregate, plastic shrinkage cracking, wind tunnel, durability
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