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Improvement of Recycled Aggregate Concrete Properties by Controlling the Water Flow in the Interfacial Transition Zone

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Abstract : The intensive use of natural aggregate, near the 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 take up space for noblest purposes. The main problem of recycled aggregate lies in its high water absorption, what is due to the porosity of the materials which constitute this type of aggregate. When the aggregates are dry, water flows from the inside to the engaging cement paste matrix, and when they are saturated an inverse process occurs. This water flow breaks the aggregate-cement paste bonds and the greater water concentration, in the interfacial transition zone, degrades the concrete properties in its fresh and hardened state. Based on the water absorption over time, it was optimized an staged mixing method, to regulate the said flow and manufacture recycled aggregate concrete with levels of work-ability, strength and shrinkage equivalent to those of conventional concrete.The physical, mechanical and geometrical properties of the aggregates where related to the properties of concrete in its fresh and hardened state. Three types of commercial recycled aggregates and two types of natural aggregates where evaluated. Six compositions with different percentages of recycled coarse aggregate where tested.

Keywords : recycled aggregate, water absorption, interfacial transition zone, compressive-strength, shrinkage
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