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Material Properties of High-Strength Self-Compacting Concrete Made With Fully Recycled Aggregate: An Experimental Study

In this study, the effect of single and hybrid fibers on mechanical properties and impact behavior of high-strength self-compacting concrete containing fully recycled aggregate has been investigated in three parts: mechanical properties, impact behavior, and durability properties. The used fibers are steel and polyvinyl alcohol fibers, which were added to the plain mixture. The various mix compositions were made to consider the effect of different fiber combinations, contents, and types. The sustainable high-strength concrete used in this study was composed of fully recycled fine aggregate, different contents of steel and polyvinyl alcohol fibers, and constant content of fly ash as a partial cement replacement. The properties of prepared concrete were determined using the water absorption, the ultrasonic pulse velocity, the repeated drop weight impact, the splitting tensile strength, the compressive strength, and the flexural strength tests. The results show that by adding fibers to concrete made of fully recycled aggregate, the mechanical properties are improved, and this effect is significantly dependent on the type, the percentage, and the selected form (single or blended) of fibers. On the other hand, by adding fibers to the control mixture, the adsorption capacity and energy dissipation of the samples tested in the drop weight test have been significantly increased.

Keywords: Waste Granite, Self-Compacting Concrete, Mechanical Properties, Steel Fiber, PVA.

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