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EFFECTS OF BAMBOO FIBERS AND LIMESTONE POWDER ON FRESH PROPERTIES OF SELF-COMPACTING CONCRETE

ANTHONY NKEM EDE, OBATARHIE OSHOGBUNU, OLUWAROTIMI MICHAEL OLOFINNADE, KAYODE JOSHUA JOLAYEMI, SOLOMON OLAKUNLE OYEBISI, OLUWASEUN GRACE MARK, and PAUL OLUWASEUN AWOYERA

Dept of Civil Engineering, Covenant University, Ota, Nigeria

Self-compacting concrete (SCC) flows through densely steel reinforced elements and consolidates under self-weight without need for vibration or compaction. This helps in complex and densely reinforced structures. The integration of fibers and fillers in concrete improves its general properties. The addition of fibers in particular can regulate the flow and workability of the concrete; hence, the high workable nature of SCC can be an ideal mix for the incorporation of fibers. This research investigates the effect of bamboo fibers and limestone powder on the fresh properties of self-compacting concrete. Bamboo fibers of an aspect ratio of 50 and varied volumes of 0.25%, 0.5%, 0.75% and 1% were adopted for this research. The workability of the mix was assessed by slump flow test and V- funnel test. For fiber volumes of 0.25%, 0.5%, 0.75%, it was observed that the coarse aggregate was evenly distributed across the spread, indicating good viscosity and stability of the mix. The presence of 10% percent limestone powder improved the workability of the concrete mix. This can be attributed to filler properties of limestone powder, which, affecting the cement particle system, changed the ordinary distance between them and modified the water quantity available for the hydration process. These results proved that the bamboo fiber and limestone powder can be sustainably adopted to regulate the flow-ability of SCC without compromising desired properties.

Keywords: Natural fiber, Workability, Flowability, Congested reinforcement, Slump test, V-funnel test.

1 INTRODUCTION

Concrete is a revolutionized material over the years of human existence and both open to accommodate new inclusions and give rise to new types. Vast use of concrete made up of lime and volcanic ash was verified during the era of Roman Empire (Li 2011). Then came the era of concrete using the blend of Portland cement, fine and coarse aggregates, admixtures and water. Currently, concrete is the primarily material adopted by the construction industry for it the ability to be molded into different shapes and for affordability. In today's sustainability-driven world, guided by the ever-increasing concern for the deteriorating environment, efforts are made to create more ecological concrete with many constituent materials substitution (Olofinnade *et al*. 2016 and 2017, Ede *et al*. 2017 and 2018). The use of concrete worldwide is twice as much as wood, steel, aluminum, and plastics put together, and are only exceeded in the present world by the usage of naturally occurring water (Koehler and Fowler 2007). Self-compacting concrete