



Eco-friendly self-consolidating concrete production with reinforcing jute fiber

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ARTICLE INFO

Keywords:

Self-consolidating concrete
Jute fiber
Rheological properties
Mechanical properties
Microcracks

ABSTRACT

Self-consolidating concrete (SCC) has many advantages compared to traditional concrete. However, it often suffers from high brittleness that limits its various applications. Reinforcing the SCC by fiber inclusion can be a fruitful way to enhance its performance. This study aims to investigate how the rheological and mechanical characteristics of SCC are affected by the addition of jute fibers for a specific length of 20 mm at various volumetric fractions of 0.1%, 0.25%, 0.50%, 0.75%, and 1%. Slump flow, J-ring flow, V-funnel, L-box, and Sieve stability tests were performed to investigate the rheological properties of jute fiber reinforced self-consolidating concrete (JFR-SCC); while, compressive, splitting tensile, and flexural strength tests were conducted to determine mechanical properties at 7 and 28 days. Scanning electron microscopy (SEM) testing was also used to examine the microstructures of JFR-SCC. These rheological and hardened states were then compared with the control SCC. JFR-SCC performed satisfactorily in terms of flowability, viscosity, and segregation resistance. However, adding more than 0.25% jute fiber in SCC mixes significantly affected the passing ability. The maximum improvements in compressive, splitting tensile, and flexural strength were 2%, 21%, and 18%, respectively, over the reference mix at 28 days. The jute fibers can fill the microcracks in concrete and prolong the ultimate failure. Hence, SCC with jute fiber can be adopted as an eco-friendly alternative to SCC with artificial fibers.

1. Introduction

Concrete that exhibits an outstanding flowability property in its rheological state is termed self-consolidating concrete (SCC) [1]. SCC may flow through any obstructions, including reinforcement or small gaps in formwork, and it can compact there without the aid

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