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MICROSCOPIC AND MECHANICAL ANALYSIS OF HYBRID FIBER REINFORCED CONCRETE

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Abstract

Concrete, the most significant and commonly utilized element, is expected to have very high strength and adequate workability properties and efforts in the field of concrete technology are made to improve the properties of concrete utilizing up to some amounts of fibers. The term hybrid generally refers to the combination of composites, and consists of multi-property material. Therefore, the matrix is named with hybrid fiber reinforced concretes. The aim of this research work was to test the viability of concrete on the Hybrid fiber by testing the concrete behavior at fresh and hardened state, i.e. workability, compressive, split tensile, flexural strength by varying proportions of steel and polypropylene fibers respectively and to compare with control concrete specimen with no addition. All the tests were carried out in accordance with the guidelines set by ASTM standards. It was observed that the workability of the mixtures decreased by increasing the percentage of hybrid fibers more bonding effect thus decreases the workability. Compressive, flexure and split tensile strength increases as the Steel fiber content in hybrid fiber increases to a certain extent and then decreases as the fiber content increases further. It is recommended that for strength enhancement, the Hybrid fiber can be used as steel fiber reinforcement up to Steel 0.85 and Polypropylene 0.15 respectively.

Introduction

With global innovations in sustainability, it is critical that Fiber Reinforced Concrete (FRC) boost tensile strength, hardness, ductility, post-cracking resistance, fatigue characteristics, longevity, shrinking properties, effects, cavitation, erosion tolerance, and concrete serviceability [1]. Beton's shear, bending and serviceability properties improve if the RCC beam is reinforced with textile besides this the crack width also reduces Concrete reinforced with cellulose has shown that the crack width is less than that of plain concrete besides having less crack width, Reinforced concrete with cellulose was found to 40 percent tougher than unreinforced concrete [2]. Analogous to that of steel, it has been found that fiber like armed enhances concrete strength. The use of FRC has increased over the past two decades [3]. In each lathe industry, waste is accessible in the form of steel scraps created by the lathe machines in the process of finishing various sections of the machine and dumping this waste into the barren soil which contaminates the soil and groundwater and creates an unhealthy environment. Such steel scraps are once a day used by creative manufacturing companies as well as in the road and highway sectors as surplus materials [4].