International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 05 | May - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Study on Fiber Reinforced Concrete with M Sand

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Abstract

Monofilament fibers have emerged as a promising additive for concrete, offering significant improvements in strength, durability, and resistance to cracking and degradation. The primary Objective of this research is to provides an overview of the properties and applications of monofilament fibers in concrete, highlighting their benefits and potential uses. The effects of monofilament fibers on concrete's mechanical properties, such as tensile strength, flexural strength, and impact resistance, are discussed. Additionally, the research explores the role of monofilament fibers in reducing shrinkage cracking, improving thermal cracking resistance, and enhancing fatigue performance. Sustainability of concrete is affected by cracks which are proved to be detrimental for durability properties they tend to propagate under the influence of loads and result in entry of aggressive agents from surrounding environment. Monofilament fiber in concrete act as crack arrester along with altering the fresh and hardened properties due to improper packing and dispersion issues which has adverse effect on concrete.Finally, the abstract highlights the significance of continued research and development in this field to unlock the full potential of monofilament fibers in advancing the performance and sustainability of concrete structures.

INTRODUCTION:

Concrete is one of the most versatile building materials. The advantages of using concrete include high compressive strength, good fire resistance, high water resistance, low maintenance, and long service life. The disadvantages of using concrete include poor tensile strength, low strain of fracture and formwork requirement. The major disadvantage is that concrete develops micro cracks during curing. Hence fibers are added to concrete to overcome these disadvantages. Monofilament fibers is a type of synthetic fibers used in concrete to improve its strength, durability, and resistance to cracking. Here are some benefits and characteristics of using monofilament fibers in concrete.

Purpose of research work: The purpose of research on making concrete using monofilament concrete could be to explore its potential benefits, such as increased tensile strength, crack resistance, and durability compared to traditional concrete. Researchers might be investigating how the addition of monofilament fibers affects various properties of concrete and its performance .

Role of fiber: Polypropylene fibers hinder the generation and propagation of micro-cracks in concrete. It plays the role of supporting aggregate. And its effect is to prevent the settlement of the coarse and fine aggregate. That is the coarse aggregate sinks first, and then the fine bone material. Meanwhile, polypropylene fibers can also reduce water precipitation on the concrete surface

OBJECTIVE:

1.To study the mechanical properties and durability of FRC.
2.To examine FRC resistance to cracking,shrinkage and impact.
3.To assess FRC suitability for construction application.

LITERATURE REVIEW:

Kolli Ramujee (2013)

The interest in the use of fibers for the reinforcement of composites has increased during the last several years. A combination of high strength, stiffness and thermal favorably characterizes the fibers. In this study, the results of the Strength properties of Monofilament reinforced concrete have been presented. The compressive strength, splitting tensile strength of concrete samples made with different fibers amssounts varies from 0%, 0.5%, 1%, 1.5% and 2.0% were studied. The samples with added Polypropylene fibers of 1.5 % showed better results in comparison with the others.

Milind V. Mohad (2015)

This paper presents an experimental study on performance of Monofilament fiber reinforced concrete. In this study deals with the effects of addition of various proportions of polypropylene fibers on the properties of High strength concrete (M30and M40 mixes). An experimental program was carried out to explore its effects on compressive, tensile, flexural strength under different curing condition. The main aim of the investigation program is to study the effect of Monofilament fiber mix by varying content such as 0%, 0.5%, 1%, 1.5% & 2% and finding the optimum Monofilament fiber content. A notable increase in the compressive, tensile and flexural strength was observed. However, further investigations were highly recommended And should be carried out to understand more mechanical properties of fiber reinforced concrete.

METHODOLOGY:

Step 1-Design the concrete mix by recommended standards or established procedures.
Step 2- Measure all materials accurately using the weighing balance.
Step 3- Thoroughly mix the dry ingredients in a clean mixer. Gradually add water while mixing to achieve a uniform and workable concrete mix.
Step 4- Casting Specimens**.**
Step 5-Curing should be done.
Step 6**-** Carefully remove the specimens from the molds after 24 hours.
Step 7- Compressive Strength Testing**.**

Conclusion:

Using monofilament fibers in structural concrete offers several advantages. Firstly, they enhance the toughness and durability of concrete by reducing cracking and controlling crack widths. This helps in improving the overall performance and longevity of the concrete structure. Secondly, monofilament fibers can also improve the impact resistance of concrete, making it more suitable for applications where impact loading is a concern. Additionally, monofilament fibers can provide better resistance to shrinkage cracking, which is particularly beneficial in large concrete pours or in situations where drying shrinkage is a concern. Overall, the use of monofilament fibers in structural concrete can result in more robust and durable structures with improved mechanical properties and enhanced durability. However, it's essential to carefully consider the specific requirements of each project and consult with structural engineers to determine the most suitable fiber type, dosage, and mix design for optimal performance.

RESULTS:

In this study the value of compressive strength for different replacement of Monofilament fiber (0.5%, 0.75%, and 1%) at the end of the curing periods (7 days, and 28 days) are given in the above table.. This shows the variation of compressive strength with Monofilament fiber replacement at different curing ages respectively. The compressive strength at 0.75% Monofilament fiber replacement is satisfying. While the 1% replacement of Monofilament fiber does not fulfill the requirements.