

Effect Of Magnetized Water in Coconut Fibre Reinforced Concrete

Mohammed Hashir p

ME Structural Engineering, Tamil Nadu College of Engineering, Coimbatore

Abstract—Water is a crucial component in concrete for hydration and curing. Recent developments have introduced the use of magnetized water, which alters the water's physical characteristics like pH and hardness through exposure to a magnetic field. This study investigates the effect of using magnetized water and coconut fibre in concrete. Magnetized water was prepared by circulating it through a magnetic field for 3–4 hours. 0.5% coconut fibre was added to the mix. The concrete specimens were tested for compressive and split tensile strength. The results indicate significant improvements over conventional mixes, showcasing magnetized water and coconut fibre as an effective, eco-friendly reinforcement strategy.

I. INTRODUCTION

Concrete, though a widely used construction material, poses sustainability concerns due to cement production and resource consumption. Improving the performance of concrete using non-traditional methods is of growing interest. Magnetized water, when used in concrete, enhances hydration and bond strength. Similarly, coconut fibre offers tensile resistance, crack control, and ductility, making it an eco-friendly reinforcement alternative. The magnetic field can break down the water clusters and reduce the bond angle and hence increase solubility. It is believed that after applying a strong magnetic field, water will show diamagnetism. Diamagnetism refers to substances that are magnetized in a way opposite to the direction of magnetic field, having pair-up electrons which cancel each other's magnetic moment because the two electrons in a pair-up rotate opposite to each other. Since water molecules are fixed in orientation, they are restricted to form water clusters due to chances of reducing matched orientation of water molecules in a cluster. Hydrogen bonds' association percentage will decrease. In other words, larger water clusters are cut and broken down by external magnetic field to form

smaller water clusters or double water molecules [2(H₂O)] or even single water molecule (H₂O). The structure of water is aligned in one direction after magnetization, and the molecule sizes change after the bond angle changes, therefore viscosity and surface area increase by magnetization, hence the hydration rate increases. When water is exposed to magnetic field, the consolidation degree between water molecules decreases and the size of the molecules increases, thereby changing some of its physical and chemical characteristics such as viscosity, solubility, temperature, specific weight, surface tension, electric conductivity, pH, permeability pressure

II. OBJECTIVE

To investigate the effects of magnetized water and coconut fibre on the strength and performance of concrete, specifically compressive and split tensile strength. To compare the normal concrete, magnetized water concrete and strength enhancement by use magnetic water with additional of coconut fibre

III. SCOPE OF PROJECT

The project evaluates how the alteration of water properties through magnetization and the inclusion of natural coconut fibre influence concrete's strength, workability, and durability.

IV. LITERATURE REVIEW

Past studies confirm that magnetized water improves hydration, reduces water hardness, and strengthens concrete. Researchers like Aishwarya Kharde and Wenjie Wang have shown performance increases with natural fibres and magnetic treatment. Enhanced strength, reduced crack formation, and eco-friendly

alternatives are key outcomes. Through research and tests the change in properties of concrete when normal water is replaced by magnetic water is observed. The magnetized water helps in increasing the compressive strength in concrete and the problem of shrinkage crack formation due to the higher heat of hydration is eliminated by the addition of coconut fibre. Addition of Coconut fibre helps in increasing the flexural strength of concrete. Water used for mixing the concrete is circulated through a magnetized water setup. A pump is used to pass the water through the magnetic field. In this setup two magnets with high strength are fixed to the pipe on opposite sides having opposite faces, this will produce the strong magnetic field in between the two magnets. Water is then passed through this pipe with constant rate for 4 hours. As per IS-456:2000 water used for mixing and curing shall be clean and free from injurious amounts of oils, alkalis, salts, sugars, organic materials or other substances that may deleterious to concrete or steel. In the work we will use, available tap water and magnetized it for concreting

V. METHODOLOGY

The materials include OPC 53 grade cement, manufactured sand (M-sand), coarse aggregates, coconut fibre, and magnetized water. The water was magnetized using a circular loop of magnets and circulated for 3–4 hours. Coconut fibres were cleaned and cut to 4–5 cm lengths and mixed at 0.5% volume fraction. Water used for mixing the concrete is circulated through a magnetized water setup. A pump is used to pass the water through the magnetic field. In this setup two magnets with high strength are fixed to the pipe on opposite sides having opposite faces, this will produce the strong magnetic field in between the two magnets. Water is then passed through this pipe with constant rate for 4 hours. As per IS-456:2000 water used for mixing and curing shall be clean and free from injurious amounts of oils, alkalis, salts, sugars, organic materials or other substances that may deleterious to concrete or steel. In the work we will use, available tap water and magnetized it for concreting. Standard concrete mixes were cast and cured before testing for compressive and tensile strength.

VI. RESULTS AND DISCUSSION

Magnetized water showed increased pH (from 6.8 to 8.2) and zero hardness, indicating a positive chemical shift. Concrete made with magnetized water and coconut fibre exhibited a notable increase in strength parameters compared to conventional concrete. The synergy of these two materials led to enhanced bonding and internal resistance.

VII. CONCLUSION

This study shows that magnetized water improves the hydration process and strength of concrete. The addition of coconut fibre further improves the mechanical properties by enhancing tensile behavior and crack resistance. The method is cost-effective, sustainable, and suitable for applications in eco-conscious construction. In this project we improve the strength of concrete by using magnetic water additional of coconut fiber. It is economic cost and ecofriendly. The specimens are casted not only by using magnetic water and also by coconut fiber. In this magnetic water technology, the strength of concrete gets increase by adding admixture or additives like coconut fiber. The magnetic water technology gives less investment and it can be used for long period (in years). As the recirculation time increases the pH value of magnetic water also increases. The benefit of this project is replacement of material, and also increases the strength of concrete

REFERENCES

- [1] Aishwarya Kharde et al., "Influence of Magnetized Water on Fibre Reinforced Concrete," 2020.
- [2] Wenjie Wang and Nawawi Chouw, "Behaviour of CFRC under Impact Loading," 2017.
- [3] C. Nived et al., "Effect of Magnetized Water with Coconut Fibre Reinforced Concrete," 2020.
- [4] Mokhtar Ansari and Amir Safiey, "Interaction of Magnetic Water and Polypropylene Fibre," 2021.
- [5] Rui-sheng XIONG and Chao-fei SHAO, "Magnetized Water in Cement and Concrete," 2016.