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(57) Abstract :

This invention introduces an innovative approach to reinforcing concrete with coir fibers, aimed at enhancing its mechanical properties for broader application in construction. By optimizing fiber orientation and lengths within the concrete matrix, the invention achieves significant improvements in tensile, flexural, and compressive strengths, contributing to more durable, sustainable, and economically viable construction materials. This invention introduces a concrete composite material incorporating strategically oriented coir fibers to enhance mechanical properties significantly. Through rigorous testing, it was demonstrated that concrete reinforced with short coir fibers oriented parallel to the casting direction achieved a 47.9% increase in compressive strength at 14 days of curing, reaching 39.64 N/mm², compared to 26.81 N/mm² for conventional concrete. Flexural strength tests revealed a modest but notable improvement, with fiber-reinforced beams exhibiting an average strength of 9.43 MPa, compared to 9.13 MPa for control samples. Furthermore, the split tensile strength of fiber-reinforced concrete cylinders showed a 15% increase, achieving 3.345 N/mm² over 3.02 N/mm² in standard concrete after 14 days. These empirical enhancements, underpinned by detailed graphical analyses, establish this invention's potential to revolutionize concrete reinforcement with a focus on sustainability, durability, and mechanical performance. This structured format aligns with the requirements for a patent document, presenting a clear and concise description of the invention, its background, objectives, and detailed methodologies, culminating in specific claims about the novelty and applicability of the enhanced concrete composite.

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