ABSTRACT

Enhancing the resilience of concrete is critical to improving its capacity to endure wear, strain, and different types of deterioration. This fortification considerably increases the lifespan of structures by protecting them from the erosive effects of weathering and chemical degradation. Concrete that has been strengthened is better able to maintain structural integrity, which is especially noticeable in the construction of buildings and critical infrastructure. The increased durability enables for greater weights to be accommodated as well as increased resistance to external factors such as wind, seismic activity, and vibrations. Notably, increased concrete toughness contributes significantly to structural safety by lowering the danger of collapse or failure, which is crucial for buildings such as bridges, dams, and architectural edifices. However, the addition of jute fiber to the concrete matrix showed certain complications. While reinforcing concrete with jute fiber adds desirable properties, it also reduces the material's workability. When jute fiber was removed from the concrete, it had the best workability across all classes. The influence on compressive strength has also been significant, particularly when a 0.75% inclusion of 12.7 mm length fiber with a 0.50 water to cement ratio resulted in a drop in compressive strength. Furthermore, an intriguing pattern in the lowering of strength deviation in jute fiber-reinforced concrete samples over time appears. While there was a 27% reduction after 7 days, this dropped to 20% after 14 days and then to 18% after 28 days compared to control sample. Normal concrete fails suddenly at crushing load and pieces of it scatters all around it during compressive failure. The failure pattern is brittle and it does not absorb as much energy compared to ductile materials before failure. But jute fiber reinforced concrete crushes at slower pace and after failure it does not scatter all over the place. Adding jute fiber improves the toughness of the concrete, reduces brittle failure. Jute fiber-reinforced concrete is useful for both in structural and non-structural applications such as buildings, pavements, walkways, and small-scale construction projects. Furthermore, jute fiber reinforced concrete is preferred than normal concrete on earthquake resisting buildings for its increased toughness.

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