

# Use of Coconut Husk Fiber for Improved Compressive and Flexural Strength of Concrete

<sup>1</sup>Anthony Nkem Ede and <sup>2</sup>Joshua Olaoluwa Agbede

**Abstract**— Rapid crack propagation, brittle mode of failure and increased overload are common in concrete structures due to the low tensile strength of concrete. Although conventional steel reinforced concrete is the most popular method developed to reduce such problems, it is rather becoming expensive in terms of its costs and sustainability issues. Because of the huge capital investment to run the steel industry, many manufacturers in the developing nations try to cut corners by reducing the quality of steel thereby reducing the strength. This has led to a lot of challenges including building collapse accompanied by devastating economic and human loss. For these drawbacks, the development of contemporary concrete technologies such as eco-friendly and affordable coconut fiber reinforced concrete needs more investigation. This research studies the effect of coconut fibers on the strength of concrete which includes the compressive and the flexural strength of normal concrete. The fibers were used in different percentages (0%, 0.25%, 0.5%, 0.75%, and 1.0%) of the weight of the fine aggregates. 16 short beams were used for flexural strength at 0%, 0.5% and 1.0% fiber content which were tested after curing for 7 and 28 days. Destructive and nondestructive compressive tests were conducted on 40 concrete cubes to doubly validate the test results. The correlation of the two tests results were very good. The results showed that the compressive strength of coconut fiber-reinforced concrete increased with curing age and with increasing percentage of coconut fiber up to 0.5% then gradually began to decrease from 0.75% to 1.0%. The percentage strength gained at 28 days for 0.25%, 0.5%, 0.75% and 1.0% fiber contents with respect to the control sample are 4.58%, 38.13%, 8.56% and -2.42% respectively. The results for the flexural strength of concrete showed that strength gained at 28 days for 0.25%, 0.5% and 1.0% of coconut husk fiber were 28.82%, 22.15% and 0.42% respectively.

**Index Terms**— Coconut Fiber, Compressive Strength, Flexural Strength, Fiber Reinforced Concrete, Nondestructive Test.

