

Received: 19 December 2019 • Accepted: 17 February 2020

Research

doi: 10.22034/jcema.2020.215337.1013

# Experimental Investigation on the Effect of Nano carbon Tube on Concrete Strength

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## ABSTRACT

This work presents in evaluation regarding to the addition of CNTs dispersion in water ultrasound before its incorporation into concrete mass. The dispersion of carbon Nanotubes has been achieved by the use of carboxylate along with vigorous agitation by sonification. The various researches have reported varied results experimenting with different amounts of CNTs and different dispersion techniques leading to a conclusion that 0.02% to 0.5% additions of CNTs to cement enhance the properties greatly. Nanoparticles have filled the porosity of concrete, therefore reduced permeability and increased the concrete strength and its sustainability. In this research, the Nanocarbon tube for enhancing the physical properties was used. For the experimental work in this research, 5 control specimens 50 x 50 x 50 mm and 5 samples containing 0.03% Nanocarbon as a percentage of sand and cement, specimens were made based on ASTM C349. In addition, water absorption test, SEM tests, electrical resistance test which show the corrosion rate, and flexural strength tests were carried out on the control and 0.03% CNTs specimens. Considering the results obtained from the experiment, the 0.03% CNT multi-wall added to the mortar the compressive strength increased by 39%; the electrical resistance increased by 78%, and flexural strength increased by about 13%. This can be attributed to the dispersion of CNT in concrete and protecting concrete from progressive cracks. In other words, treated CNT in the composite concrete matrix, provided more surface connection due to high specific areas resulted transferring more forces, so they provided better connection, therefore preventing matrix surrounding from any micro-structures cracks of the samples, also improved properties greatly.

**Keywords:** concrete properties, carbon Nanotube, stability, compressive strength, microstructure.

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## 1. INTRODUCTION

Various researches for improving the qualities of concrete are carried out worldwide. More researches were concentrated on concrete compositions. Supplementary cementing materials such as micro-silica, fly ash, and slag is more common cement replacement materials. Nanomaterial is new developed materials in concrete. The nanomaterial causes improvement in concrete mechanical properties. Nano can react physically with porosity existed in concrete and chemically with hydrated cement. Due to the fact that concrete behavior is formed on a micro-scale, therefore, using Nanoparticles can play an important role in enhancing the properties of the concrete. Also, by producing new Nano with a high specific surface and using them in concrete as a composite material, compressive strength properties, durability, and quality can be improved. A research work by Marcondes et al. [1]

Focused on the importance of performing the CNTs dispersion in water ultrasound before incorporation into the concrete mass. Three concrete mixtures were performed, one without CNTs (as control), one with previous, dispersion in water an additive using ultrasonic and other without dispersion. They were used multi-walled CNTs. 0.3% CNTs with respect to cement is used in each mixture. In their research, properties such as fluidity, compressive, tensile strength, and water absorption were analyzed. As a result, in the series test with and without CNTs dispersion with ultrasonic 37% and 17% in compressive strength increased respectively, in comparison with control samples. The tensile strength also increased by 17% and 19%, respectively. The water absorption by the addition of CNTs is reduced. Shubham [2] carried out a comprehensive investigation in the field of CNTs. The additions of CNT in