

The Effect of Carbon Nanofibers on the Electrical Resistance of Cementitious Composites

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Abstract : Cementitious composites like concrete, are the most widely used materials in civil infrastructures. Numerous investigations on fiber's effect on the properties of cement-based composites have been conducted in the last few decades. The use of fibers such as carbon nanofibers (CNFs) and carbon nanotubes (CNTs) in these materials is an ongoing field and needs further researches and studies. Excellent mechanical, thermal, and electrical properties of carbon nanotubes and nanofibers have motivated the development of advanced nanocomposites with outstanding and multifunctional properties. In this study, the electrical resistance of CNF reinforced cement mortar was examined. Three different dosages of CNF were used, and the resistances were compared to plain cement mortar. One of the biggest challenges in this study is dispersing CNF particles in the mortar mixture. Therefore, polycarboxylate superplasticizer and ultrasonication of the mixture have been selected for the purpose of dispersing CNFs in the cement matrix. The obtained results indicated that the electrical resistance of the CNF reinforced mortar samples decreases with increasing CNF content, which would be the first step towards examining strain and damage monitoring ability of cementitious composites containing CNF for structural health monitoring purposes.

Keywords : carbon nanofiber, cement and concrete, CNF reinforced mortar, smart mater, strain monitoring, structural health monitoring

Conference Title : ICSMCS 2019 : International Conference on Smart Materials for Civil Structures

Conference Location : Dublin, Ireland

Conference Dates : December 19-20, 2019