

## Experimental Investigation on the Effect of Ultrasonication on Dispersion and Mechanical Performance of Multi-Wall Carbon Nanotube-Cement Mortar Composites

**Authors :** S. Alrekabi, A. Cundy, A. Lampropoulos, I. Savina

**Abstract :** Due to their remarkable mechanical properties, multi-wall carbon nanotubes (MWCNTs) are considered by many researchers to be a highly promising filler and reinforcement agent for enhanced performance cementitious materials. Currently, however, achieving an effective dispersion of MWCNTs remains a major challenge in developing high performance nano-cementitious composites, since carbon nanotubes tend to form large agglomerates and bundles as a consequence of Van der Waals forces. In this study, effective dispersion of low concentrations of MWCNTs at 0.01%, 0.025%, and 0.05% by weight of cement in the composite was achieved by applying different sonication conditions in combination with the use of polycarboxylate ether as a surfactant. UV-Visible spectroscopy and Transmission electron microscopy (TEM) were used to assess the dispersion of MWCNTs in water, while the dispersion states of MWCNTs within the cement composites and their surface interactions were examined by scanning electron microscopy (SEM). A high sonication intensity applied over a short time period significantly enhanced the dispersion of MWCNTs at initial mixing stages, and 0.025% of MWCNTs wt. of cement, caused 86% and 27% improvement in tensile strength and compressive strength respectively, compared with a plain cement mortar.

**Keywords :** dispersion, mechanical performance, multi wall carbon nanotubes, sonication conditions

**Conference Title :** ICCET 2016 : International Conference on Concrete Engineering and Technology

**Conference Location :** London, United Kingdom

**Conference Dates :** March 17-18, 2016