

Mechanical and durability properties of ultra-high performance concrete incorporated with various nano waste materials under different curing conditions

This research presents a comparative study of different curing regimes, namely, standard curing (SC), internal curing (IC) with polyethylene glycol (PEG) and air curing (AC), used in ultrahigh-performance concrete (UHPC) premixed with different types of nanomaterials. Four types of nano waste materials were prepared, i.e. milled nano-metakaolin (NMK), nano waste glass (NWG) and nano rice husk ash (NRHA) and chemically prepared nano silica (NS). Several UHPC mixes with nanomaterial dosages (1%, 2% and 3%) were investigated. Compressive strength, ultrasonic pulse velocity, sulphate attack and microstructure were analyzed. Results indicated the similarity between the performance of SC and IC in NS, NWG and NMK. Moreover, the addition of PEG exerted a negative effect on NRHA. Compressive strength increased by 17%, 24%, 14% and 13% under IC in NWG, NRH, NMK and NS, respectively. By contrast, sorptivity decreased by 84%, 60%, 48% and 60% in NS, NMK, NWG and NRHA under IC.