

Effect of nanoclay and burnt limestone powder on fresh and hardened properties of self-compacting concrete

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ABSTRACT:

The growing rate of cement production and construction waste due to rapid urbanization is producing environmental threat.

Therefore, it is necessary to replace fully or partially with reinforcement material. Thus, in this research work, sulfate resistance cement (SRC) was replaced with different weight percentages of nanoclay (NC) (2, 4 and 6%) and burnt limestone powder (BLP) (50, 75 and 100 kg) to produce self-compacting concrete (SCC) for investigating the fresh and hardened properties. The local Iraqi natural Kaolin clay was calcinated at 700 °C for 2 h and milled for 40 h through ball milling to produce NC. Further, the limestone powder was burnt at 700 °C for 2 h and partially replaced with SRC. The ball milling successfully reduced clay to a particle size of < 75 nm sized for NC. Moreover, the inclusion of NC and BLP significantly affected the fresh properties of SCC. For hardened properties, the inclusion of both mixtures gradually increased hardened properties; however, the NC-incorporating SCC specimens have higher hardened properties than reference SCC (SCC0), whereas the lower weight percentages of BLP provided insignificant hardened properties. Additionally, as based on results, both mixture material (NC and BLP) can be utilized for producing SCC.