

The performance of mortars incorporates nano-sized palm oil fuel ash on water absorption and sorptivity at early age of hydration

ABSTRACT

The durability performance of mortar at the early age of hydration is also affected by the pores system of the hardened cement matrix. The inclusion of supplementary cementing material (SCM) in nanosized particles might modify the durability behavior of mortars. Thus, the present study investigates the water absorption and sorptivity of mortar incorporates nano-sized palm oil fuel ash (nPOFA) at an early age of hydration. The Ordinary Portland Cement (OPC) cement was replaced with microsized palm oil fuel ash (mPOFA) and nPOFA in quantities ranging from 10% w/w to 30% w/w and 10% w/w to 60% w/w, respectively. The binder-to-sand ratio in mortar specimens was kept constant at 1:2.75. Water absorptivity and sorptivity tests were performed on the mortars at 28 days of curing age. It is observed that after 720 min of testing, the water absorption of 10nPOFA-40nPOFA mortars was found to be lower than that of 10mPOFA-30mPOFA mortars. Nonetheless, the water absorption for all mortars in the 720 min duration test was still above 10% by mass. According to the sorptivity test, the 20mPOFA mortar had the lowest sorptivity among the mPOFA mortars, while the 30nPOFA mortar had the lowest sorptivity among the nPOFA mortars. At this age, it is suggested that all mortar specimens are considered less durable due to the high-water absorption. It also suggested that as nPOFA is used in lieu of cement up to 40 % replacement by mass, the pores system of the hardened cement matrix improves when compared to mPOFA mortar.