The performance of ultrafine palm oil fuel ash in suppressing the alkali silica reaction in mortar bar

ABSTRACT

This study evaluates the effect of ultrafine palm oil fuel ash (POFA) on the alkali silica reaction (ASR) of mortar. To study the effectiveness of ultrafine POFA in suppressing the ASR, four different sizes of POFA were used in this study: the unground (UG), medium (MP), fine (FP), and ultrafine size (UF). Characterization of POFA was done to investigate their particle size, fineness, specific gravity, chemical composition, loss on ignition (LOI), and morphology. Initially, the pessimum effect of the sandstone aggregate was determined by blending 5, 15, 50, 75, and 100% of sandstone aggregates with the granite. POFA was then introduced as cement replacement at 0 - 40% by weight of binder. To investigate the effect of ultrafine POFA on ASR, ASTM C1260 and ASTM C1567 were adopted. The strength activity index was also determined to study the pozzolanic effect of the ultrafine POFA. Results show that the ultrafine POFA significantly increase the pozzolanic reactivity of mortar. At 14-days of testing, ultrafine POFA shows higher resistance against the alkali silica reaction (ASR) attack compared to coarser POFA. Higher level of replacement is required for coarser POFA to resist ASR attack in the mortar bar.