

Influence of elevated temperatures on physical and compressive strength properties of concrete containing palm oil fuel ash

Abstract:

The residual compressive strength of concrete containing palm oil fuel ash (POFA) after exposure to elevated temperatures and subsequent cooling was investigated. Specimens from ordinary Portland cement (OPC) and POFA concrete mixes were prepared and subjected to various temperature levels. The POFA concrete contains 20% partial replacement of cement by weight and the temperature levels are; 100, 300, 500 and 800 °C. Two cooling systems which include cooling at room temperature by the natural breeze and water-spray were involved. Compressive strength test was conducted on control specimens as well as concrete specimens revived through the two cooling systems. Physical properties accompanying thermal degradations were also assessed. Residual performance as a ratio of residual strength to original strength was evaluated. The residual performance was found to be higher in POFA concrete than in the normal concrete. In addition, water-cooling was realized to aggravate strength reduction in both normal and POFA concretes when compared with air-cooling. High temperature and cooling system were also found to have great influence on physical properties, such as; mass loss, discolouration and crack patterns