

Effect of the incorporation of PET fiber and ternary blended binder on the flexural and tensile behaviour of ultra-high performance green concrete

Aktham H. Alani, Megat Azmi Megat Johari , Ahmed Tareq Noaman , N. Muhamad Bunnori , T.A. Majid

Ultra-High performance Fiber Reinforced Green Concrete is an advanced technology in concrete sustainability via the utilization of green alternative materials, with superior mechanical properties. The effects of adding recycled waste plastic bottles in the form Polyethylene Terephthalate (PET) fiber on the flexural and tensile behavior of Ultra-High Performance PET Fibre Reinforced Green Concrete (UHPPFRGC) containing different volumes of Ultra-fine palm oil fuel ash (UPOFA) and Silica Fume (SF) have been investigated. Up to fourteen concrete mixtures were designed with varying UPOFA and SF content as partial replacement of ordinary Portland cement (OPC) in volumes of (25%- 50%) UPOFA and (10%-20%) SF. PET fibres were added at a portion of 1% from the total mixture volume. The results showed that the addition of PET fibres modulates the stiff and brittle behaviour of Ultra High-Performance Green Concrete (UHPGC). The optimum values were registered with (U25- SF20-UHPPFRGC) mix containing 25%UPOFA, 20%SF and 1% PET fibres. A considerable increased in ductility index was achieved, with superior compressive strength, splitting tensile strength, flexural strength, flexural toughness and flexural stiffness of 153 MPa, 9.31 MPa, 30.1 MPa, 29.7 kN.mm and 18.225kN/mm, respectively. Thus, the utilization of ternary blended binders (OPC-UPOFA-SF) with recycled PET fibres could promote the production of UHPPFRGC possessing adequate flexural and tensile strength properties.