

Mechanical characteristics of PET fibre-reinforced green ultra-high performance composite concrete

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Experimental investigations were performed to evaluate the effect of waste Polyethylene Terephthalate (PET) fibres on the mechanical properties of Green Ultra-High Performance Cementitious Composites (GUHPCCs). Ultrafine Palm Oil Fuel Ash (UPOFA) and Silica Fume (SF) were utilised to produce GUHPCCs that consist of up to 50% UPOFA and 20% SF as a partial replacement binder with cement. PET fibres were added to the GUHPCCs at a proportion of 1% of the total mixed volume, to produce Green Ultra- High Performance PET reinforced Cementitious Composites (GUHPPCCs). The mechanical properties and flexural performance of the resulting beams and slabs, including their stress–strain behaviour and ductility, were investigated. Results showed that addition of PET fibres increases the flexural strength of GUHPPCCs beams by approximately 63.24% compared with that of the ultra-high performance concrete control at the age of 90 days. Moreover, significant improvements in the flexural capacity and ductility index of the GUHPPCCs slabs were obtained. These findings may due to the bridging effects of PET fibres. Thus, the combination of UPOFA and SF with PET fibres can produce GUHPPCCs with superior mechanical properties and enhanced ductility.