An Experimental Investigation on Properties and Microstructures of Mortar Incorporated with Recycled Fibre-Reinforced Polymer (rFRP) Composite Waste

Yunyun Tao[1]
Ali Hadigheh[1]
[1] School of Civil Engineering, Faculty of Engineering, The University of Sydney, Sydney, New South Wales 2006, Australia

FRP composites have been widely adopted for manufacturing of products by various industries due to their unique features such as the lightweight and high strength performance compared to traditional metallic alloys. This popularity has resulted in a large amount of composite waste to be generated during the manufacturing process as well as at the end of product life cycle. Hence, it is necessary to develop sustainable techniques to recycle FRP composite wastes. The present study experimentally investigates microstructural and performance characteristics of recycled FRP (rFRP) incorporated mortar, including mechanical performance, durability aspects and electrical properties. Furthermore, the viability of incorporating rFRP waste in mortar is assessed and the influence of different dosage of FRP recyclates on various properties of concrete mortar is discussed in this paper. Short recycled carbon and glass fibres (rCF and rGF) in various amounts are added into mortar, while recycled carbon and glass FRP (rCFRP and rGFRP) powder are used to replace fine aggregate. Microstructural characteristics (e.g. crystalline phases, gel products, cracks and voids) of rFRP integrated mortars are observed by using x-ray diffraction (XRD) and scanning electron microscopy (SEM) equipped with energy-dispersive x-ray spectroscopy (EDS). The results suggest that recycling FRP composite waste into mortar is a feasible solution and can be considered as a practical and environmentally friendly approach in the construction field.