Discarded nylon fishing nets as fibre reinforcement in cement mortar

This work builds on an idea of utilizing fibres cut from waste fishing nets for fibre reinforcement of concrete. An experimental investigation of waste fishing net polyfilament fibres of nylon 6 is reported. Differential Scanning Calorimetry confirmed the net to be nylon 6. SEM images showed that the polyfilaments consisted of twisted monofilaments (diameter 24–31 μm). The diameter of the polyfilaments was about 1.2 mm. The investigation consists of two major parts; properties of the polyfilaments and properties of mortar specimens reinforced with the polyfilaments. The tensile strength of the polyfilaments was about 260 MPa, which is low compared to the 540–1080 MPa for new nylon 6 even considering that the tensile strength was measured for polyfilaments. An even larger decrease was seen for Young's Modulus, which was found to only about 330 MPa compared to 1–3 GPa for new nylon 6. On exposure to UV radiation over a long period, nylon 6 undergo photo-oxidative degradation and this is suggested to be the major cause for the loss of tensile strength and elasticity. The few other studies reporting properties of waste nylon 6 fishing nets also report losses. Mortar specimens were reinforced with 0.5 to 2.0 wt.% waste fishing net fibres. Both flexural strength and compressive strength decreased slightly compared to the reference, but the fibre-reinforced mortar specimens all showed considerable post-peak resources and the toughness index (I5) was about 5. For comparison, mortar prisms were reinforced with commercial fibres, and for these the I5 was about 7, i.e. higher, but the results obtained with the waste fishing net polyfilaments were still highly encouraging in relation to use as fibre reinforcement of concrete.