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RECYCLING OF ULTRA-HIGH PERFORMANCE FIBRE-REINFORCED CONCRETE WITH A HIGH VOLTAGE ELECTRIC PULSE FRAGMENTATION PROCESS

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Abstract

This study deals with the recycling of a particular Ultra-High Performance Fibre Reinforced Concrete (UHPFRC) called Ductal®. This material, characterized by a high mechanical resistance and a high steel fibre content, represent a challenge for the conventional recycling processes. The high voltage electric pulse fragmentation (EPF) technology was investigated here as a potential breakthrough technology for liberating the steel fibres from the sand/cement paste, with the objective to recycle both fractions into new concrete products. The EPF technology relies on highly energetic electrical pulses to selectively fragment composite materials i.e. to generate cracks along grain boundaries. Tests were performed at lab-scale and showed that the steel fibres are liberated in the 0/2 mm size fraction. The influence of the specific energy on EPF performances was investigated. Good recovery rates of the steel fibres were obtained, confirming the potential of EPF for the recycling of UHPFRC.