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Rehabilitation of Fire-Damaged Reinforced Concrete Members by using Fiber-Reinforced Polymers and Ultra-High Fiber Reinforced Concrete: An Overview

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Abstract

Concrete is one of the most commonly used building materials because it has many advantageous mechanical properties. These properties include high compressive strength, durability, hardness, workability, and fire resistance. On the other hand, the mechanical properties of concrete deteriorate when it has been exposed to fire for a long period of time. The repair and rehabilitation of existing concrete buildings that have suffered damage are one of the most important construction projects currently underway in various parts of the world. This paper provides an overview of the ultra-high performance fibre reinforced concrete (UHPFRC) and fibre-reinforced polymers (FRP) to repair materials for concrete structures, focusing on the area of fire-damaged concrete structures. It has been shown that fibre-reinforced polymers (FRP) can effectively increase the load-bearing capacity and ductility of repaired concrete members. In addition, it was found that carbon fibre reinforced concrete (CFRP) was more efficient than glass fibre reinforced concrete (GFRP) in terms of strength and ductility enhancement. The UHPFRC has a high modulus of elasticity and long service life. It has excellent rehabilitation results in terms of increasing compressive and flexural strength. During rehabilitation, it is recommended to prepare the saturated dry (SSD) concrete surface by sandblasting to achieve the highest bond strength.

Keywords: Fire damage concrete; Rehabilitation method; Fibre-reinforced polymers; Ultra-high-performance fibre reinforced concrete.