

## Investigation on the Fire Resistance of Ultra-High Performance Concrete with Natural Fibers

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**Abstract :** Increasing concern on environmental sustainability and waste management has driven the construction and building sector towards renewable materials. In this work, we have explored the usage of natural fibers as an alternative to synthetic fibers like polypropylene (PP) in ultra-high performance concrete (UHPC). PP fibers are incorporated into concrete to resist explosive thermal spalling of UHPC during a fire exposure scenario. Experimental studies on the effect of natural fiber on the mechanical properties and spalling resistance of UHPC were conducted. The residual mechanical properties of UHPC with natural fibers were tested after heating to different temperatures. Spalling behavior of UHPC with natural fibers is also assessed by heating the samples according to ISO 834 fire curve. A range of analytical, physical and microscopic characterization techniques was also used on the concrete samples before and after being subjected to elevated temperature to investigate the phase and microstructural change of the sample. The findings show that natural fibers are able to improve fire resistance of UHPC. Adding natural fibers can prevent UHPC from spalling at high temperature. This study provides an alternative, which is at low cost and environmentally friendly, to prevent spalling of UHPC.

**Keywords :** high temperature, natural fiber, spalling, ultra-high performance concrete

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