

# Experimental Research on the Moisture Behavior of High Strength Concrete under High Temperature

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## **Abstract**

The exposure of concrete structures to unexpected high temperature, such as during fire accidents, may lead to spalling, fracture of the heated surface. Because this phenomenon is more critical in high strength concrete, a small amount of polymer fiber is used as a countermeasure to prevent the formation of the fractural stresses.

The physical process of the spalling phenomenon is assumed to be due to the gas pressure build-up inside the porous media, restrained thermal interaction close to the heated surface or the simultaneous action of both. However the mechanism of this phenomenon has not been fully elucidated yet, because it is difficult to measure the moisture behavior that is thought to be a key parameter to explain the explosive pressure formation.

In the present research, we applied neutron radiography to detect the moisture behavior under rising high temperatures to understand the spalling phenomenon of high strength concrete, focusing on the differences between the normal concrete and polymer fiber concrete.

The moment of spallation of ordinary concrete can be observed by the neutron radiography, and the moisture behavior under the fire condition can be examined by the intensity analysis of the images. The result shows that the moisture movement in fiber concrete is comparatively high, which means the PP fiber in concrete melts at the high temperature (at about 165°C) and forms relief paths which may prevent the formation of evaporative pressure of moisture.