

## Accepted Manuscript

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PII: S0263-8223(17)31961-X

DOI: <https://doi.org/10.1016/j.compstruct.2017.10.090>

Reference: COST 9065

To appear in: *Composite Structures*

Received Date: 27 June 2017

Revised Date: 12 October 2017

Accepted Date: 31 October 2017



Please cite this article as: Golewski, G.L., Effect of curing time on the fracture toughness of fly ash concrete composites, *Composite Structures* (2017), doi: <https://doi.org/10.1016/j.compstruct.2017.10.090>

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## Effect of curing time on the fracture toughness of fly ash concrete composites

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### Abstract

This paper presents the results of an experimental investigation carried out to evaluate the compressive strength and fracture toughness of concrete mixtures in which main binder (Ordinary Portland Cement – OPC) was partially replaced with Class F fly ash (FA). OPC was replaced with two percentages (20% and 30%) of FA by weight. Compressive strength and fracture toughness under mode III –  $K_{IIIc}$  (torsional loading), were determined at: 3, 7, 28, 90, 180 and 365 days. Test results indicate significant improvement in the strength properties and fracture toughness of mature concrete, by the inclusion of 20% FA as partial replacement of OPC. On the other hand, the additive of FA in the amount of 30% weight of OPC has a beneficial effect on the mechanical parameters of concrete only after half a year of curing. The obtained results are significant in the analysis of concrete structures subjected to complex loading, or structures where torsional moment is the basic load.

*Keywords:* curing effect, concrete composite, siliceous fly ash, fracture toughness, mode III fracture.

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### 1. Introduction

Primary components making up the structure of concrete are: Ordinary Portland cement, sand, coarse aggregate, water and optional mineral additives and chemical admixtures, e.g. [1-4].

It should be noted that for over several dozen years, with the development of a new generation of concrete composites, the production of concrete mixtures containing different classes and types

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