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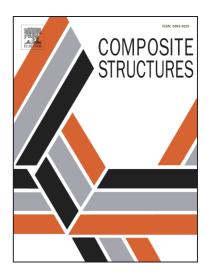
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ACCEPTED MANUSCRIPT

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 – $K_{\rm IIIc}$ (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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