MICROSTRUCTURE PROPERTIES AND COMPRESSIVE STRENGTH OF SELF-COMPACTING GEOPOLYMER CONCRETE

by

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ABSTRACT

The improvement on concrete performance and environmental concern of CO_2 emission due to cement production have become an area of interest for last many years and led to the development of alternative material. So far numerous studies have been done on the characteristics of self-compacting concrete (SCC) and that of fly ash (FA) based geopolymer concrete (GC) in both fresh and hardened state. However, no work has been conducted on self-compacting geopolymer concrete (SCGC). SCGC is an improved way of concreting execution that does not require compaction in addition to its complete elimination of ordinary Portland cement content. It needs to possess high flowability together with high segregation resistance that can be achieved by utilizing superplasticizer and high content of fine particles to attain cohesiveness. This study aims at investigating the workability characteristics, compressive strength development and microstructure properties of SCGC. The basic requirements for flowability and resistance to segregation for self-compactibility satisfied the European Federation of National Associations Representing Producers and Applicators of Specialist Building Products for Concrete (EFNARC) guideline. Results of the investigation showed that water-to-geopolymer solids ratio, NaOH solution and superplasticizer played significant role in attaining the required workability as well as in enhancing the compressive strength and refining the interfacial transition zone (ITZ) of concrete. The SCGC sample cured for 48 hours and 70°C of temperature could improve the compressive strength up to 49.26 MPa at 28 days.

Key words: Geopolymer concrete, Self-compacting concrete, Fly ash (FA), Interfacial Transition Zone (ITZ), Compressive Strength.