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Development of the cutoff grout using ground granulated blast furnace slag and carbon fiber

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ABSTRACT

This study aims to develop grout with high strength and reinforced cutoff by mixing carbon fiber, which is a recycled resource, biogrout, ground granulated blast furnace slag (BFS powder and cement. Gel-time tests of the grout for which biogrout is mixed with fiber crushing agents, BFS powder and cement, and unconfined compression strength (days 1, 3, 7, 14 and 28) of homo-gel samples to determine durability were performed. In addition, the transmissibility varying with the mixing ratio was measured. The experimental results showed that the compression strength increased as the content ratio of fiber crushing agent increased. Moreover, as the amount of BFS powder increased, the transmissibility decreased.

1. INTRODUCTION

In general, grouting techniques used in Korean construction sites focus on improving ground strength, and the cement and chemical liquid as main materials for the grouting techniques involves environmental issues, for example, carbon dioxide (CO_2) emissions and groundwater pollution. Moreover, Korea is a party for CO_2 emission limitation targets since 2015 according to the Kyoto Protocol, and should pay penalties for non-compliance of CO_2 emission limitation targets where CO_2 more than the targets is emitted. Therefore, it is necessary to develop environment-friendly materials to replace cement and reduce the use thereof in the on-site ground improvement generally by using cement to contribute to complying with the green growth policy for avoiding low-carbon global warming, and address issues of increasing raw material costs and lack of construction materials by developing new materials. As a viable option for addressing the issues, it is necessary to develop cement replacement materials.
Recently, there is an increasing interest in the ground granulated blast furnace slag as a cement replacement material, which is a waste discharged as a byproduct in the steel manufacturing process including smelting and steelmaking and chemically stable. Therefore, using the slag will reduce the volume of industrial wastes and air pollution,

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