

論文審査の要旨

博士の専攻分野の名称	博 士 (工 学)	氏名	Nguyen Viet Hoang
学位授与の要件	学位規則第4条第1・2項該当		
論 文 題 目			
Performance assessment of expansive slag concrete under different curing conditions (異なる養生条件下におけるスラグ膨張コンクリートの性能評価)			
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〔論文審査の要旨〕			
<p>Portland cement concrete usually manifests autogenous or drying shrinkage resulting in serious cracks and severe deterioration of concrete structures. To enhance the volumetric stability of concrete, one of the main measurements is to apply expansive concrete. There are two kinds of expansive concrete involving shrinkage compensating concrete (with low expansion energy) and chemical-prestressing concrete (with high expansion energy). The chemical-prestressing concrete not only compensates shrinkage but also introduces prestress inside concrete with restraining objects such as reinforced bar or the formwork. The evaluation of expansion performance of expansive concrete is required for its quality control and applications.</p> <p>The objectives of this dissertation were, firstly, to validate the applicability of the simplified method for expansion evaluation under steam curing; and secondly, to investigate the influence of slag type and curing condition on the engineering properties of expansive concrete with the validated simplified method.</p> <p>The dissertation included five chapters, and the detailed organization is described as follows.</p> <p>Chapter 1 showed the background, purposes, and methodology of this study.</p> <p>Chapter 2 provided a brief literature review relating to the research contents.</p> <p>Chapter 3 presented an experimental program to investigate the applicability of the simplified method under steam curing. Specimens were cured with steam or at 20 °C from their first casting up to 1 day. They were then sealed or water-cured at 20 °C for 7 days to investigate the effect of later curing. Two estimation methods for measuring the expansive strains under constraint were compared based on the expansive energies. The range of applicability of the simplified method was</p>			

analyzed. A new concept for the simplified method of estimating the expansion by using the axial strain was then proposed. The experimental results showed that two measurement methods exhibited a high correlation, which validates the use of the simplified method under steam curing. Chapter 4 described an investigation on the impact of slag type and curing method on the engineering properties of expansive concrete such as the strength, volumetric change and transport characteristics. The two different slag compositions evaluated were combined with ordinary Portland cement at 50% replacement by mass. Cylindrical specimens were cast and initially cured by one-day steam or seven-day sealed 20 °C curing to investigate the effects of slag type and initial curing on the expansive concrete properties. The specimens were then exposed to the ambient environment with 60% relative humidity at 20 °C until 91 days as the second stage of curing. The results indicate that pure slag impaired concrete performance, whereas outstanding improvement in performance was observed when using slag with gypsum. The results of this investigation can be used to provide improved concrete mix and curing design when using blast furnace slag in expansive concrete.

Chapter 5 stated the conclusions of this research and recommendations for future works.

The examining committee members evaluated that the dissertation met the standard of excellence expected of a doctoral candidate at Hiroshima University.

備考：審査の要旨は，1,500 字以内とする。