



Tests on the Mechanical Properties of Corroded Cement Mortar after High Temperature

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Abstract

Durability of cement mortar and concrete materials under sea water condition is always an important research topic. The objective of this work is to understand the mechanical properties of corroded cement mortar after high temperature, the cement mortar specimens after high temperature were placed in water and sodium sulfate solution, and then the uniaxial compression tests were carried out on the cement mortar specimens after corroded. Test results show that both the differences of compressive strength and strain at the peak stress after high temperature caused by high temperature, are relatively small when the specimens are eroded in water, and the differences are relatively high when the specimens are eroded in sodium sulfate solution. The compressive strength of the cement mortar specimens under normal temperature eroded in sodium sulfate solution is highest, and that eroded in water is lowest. The compressive strength of specimen after high temperature eroded in water is highest and that eroded in sodium sulfate solution is lowest. The strain at the peak stress of specimen, whether after high temperature or not, is highest when eroded in sodium sulfate solution, and that eroded in water is lowest. At present, there are few research results about the mechanical properties of concrete first after high temperature and then after sea water corrosion. The work in this paper can enrich the results in this area.

Keywords: Cement Mortar; High Temperature; Erosive Solution; Mechanical Properties.

1. Introduction

As for subsea tunnel concrete lining, one side is basically exposed to air, and the other sides contact with the surrounding rock and the seawater, and the lining concrete of subsea tunnel will be under the erosion of seawater. The durability of the lining concrete determines the service life of undersea tunnel. Therefore, study on the subsea tunnel concrete lining has great practical value. Mechanical properties of concrete in seawater erosion are an important indicator of the durability evaluation of concrete structures in marine environment. Many researchers have conducted test research on the mechanical properties of concrete after sea- water erosion, e.g. Park et al. [1], Lee et al. [2], Çavdar and Yetgin [3], Kathirvel et al. [4], Sirisawat [5], Xiong et al. [6], Han et al. [7], Xie et al. [8] and Li et al. [9].

The above-mentioned studies always placed specimens in erosive solution for long-term immersion, and then took some specimens out for mechanical properties test at intervals. However, fire must be considered in the design of tunnel, i.e. stability of lining structure under high temperature. A number of fire examples show that the fire will cause damage with varying degrees to the lining structure. The tunnel will collapse due to the deterioration of the mechanical

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