

Sample Translation

Civil Engineering

- See below for the original Chinese manuscript.
- **A native-speaker of English who has studied civil engineering** proofreads the translated English.
- The quality of the translated manuscript is suitable for publication in an international journal.

The Effect of High Temperature on Recycled Concrete

1. Introduction

Most of the buildings in Taiwan are constructed of concrete. Even so, lives and assets are lost to fires. Apart from blemishing the outer appearance of buildings, fire chemically and physically compromises concrete structures. It is important, therefore, to perform a safety assessment of concrete structures after fire and to understand the behavior of concrete at high temperature.

There is a vast body of literature about the fire resistivity of concrete. In recent years, especially in the aftermath of the “921 Earthquake”, an enormous amount of scrap from demolished buildings, most of which is waste concrete, has been generated. Increasing levels of awareness about environmental protection have meant that recycling is now favored over disposal to landfill and accordingly, the effective recycle of waste concrete would be of great help to the environment.

Previous studies show that recycled concrete tends to have lower elastic modulus, higher porosity, lower strength and lower durability than new concrete. Recycled concrete also differs from natural aggregate concrete in terms of fire resistivity and mechanical behavior after fire. There is little current literature on the fire resistivity of recycled concrete, which makes this study necessary.

2. Experimental Materials and Program

2.1 Experimental Materials

Here is a list of materials adopted by this study:

1. Conventional cement: Portland cement type I from Taiwan Cement Corporation with a density of 3.15;
2. Natural coarse aggregates: broken stone provided by Concrete Mixing Plant located in Lujou, Taipei.
3. Waste concrete from laboratory: waste concrete that was derived from the Concrete Laboratory, Department of Construction Engineering of National Taiwan University of Science and Technology with its original crushing strength of 3000 ~5000 psi.
4. Demolition waste from construction sites: provided by a construction materials resource disposal unit in Linkou, Taipei.

再生混凝土高溫性質與行爲之研究

一、前言

在台灣，建築物大多為鋼筋混凝土構造，但由於天災或人為疏忽發生火災，常造成個人生命財產損失之外，對社會安寧亦有相當之影響。對建築物本身而言，混凝土結構物經火災危害後，除外觀遭受破壞外，其結構體性能亦造成嚴重之損壞，因此混凝土結構物在火災後之安全評估及混凝土受高溫作用下之性質行爲分析，已顯得十分重要。

有關混凝土耐火性能在國內外已有相當多之研究成果，但近年來環保意識抬頭，且 921 大地震發生後，產生大量之建築拆除廢料，其中以廢棄混凝土佔絕大多數，這些任意拋棄之混凝土廢料若處置不當將會導致嚴重之環境污染，因此有效回收廢棄混凝土當作再生粒料用於拌製混凝土上，則可達到解決環保問題之效益。

以往研究結果顯示，建築拆除廢料或回收廢棄混凝土塊拌製之混凝土(以下簡稱再生混凝土)其工程性質較差，如同一配比下之彈性模數較小，孔隙率較大，尤其是強度及耐久性較差，在耐火性質與火害後力學行爲上與含天然粒料之混凝土有異。目前有關再生混凝土耐火性能之研究仍甚缺乏，在無法避免火災發生之今日，再生混凝土耐火性質研究有開始進行之必要。

二、試驗材料與試驗變數

2.1 試驗材料

本研究所使用之材料如下：

- 1.普通水泥：採用台灣水泥公司生產之卜特蘭水泥第一型水泥，比重為 3.15。
- 2.天然粗粒料：採用台北縣蘆洲市某混凝土拌合廠所提供之碎石。
- 3.試驗室廢棄混凝土：試驗室廢棄混凝土係取自台灣科技大學營建系混凝土試驗室，原始抗壓強度在 3000~5000psi 之間。
- 4.工地拆除廢料：工地拆除廢料係由台北縣林口鄉某營建工程土石方資源處理場所提供。