

图书基本信息

书名：<<2011土木工程结构创新与可持续发展论坛论文集>>

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## 内容概要

《结构创新与可持续发展：土木工程结构创新和可持续发展国际研讨会论文集（套装共2册）（英文版）》为“土木工程结构创新与可持续发展论坛论文集”，英文版。

全书分为上下两册，《结构创新与可持续发展：土木工程结构创新和可持续发展国际研讨会论文集（套装共2册）（英文版）》是在“钢筋混凝土及预应力混凝土基本理论国际学术研讨会”的基础上集结而成。

在该会议上，10位国际著名学者做了大会主题报告，14位国际知名学者做了邀请报告，100多位代表做了专题报告，国际结构混凝土协会FIB主席G.Mancini教授也专程从意大利赶来参加会议。

大会就土木工程新材料及其应用、工程结构的创新、结构的耐久性和健康监测、结构防灾及减灾性能研究等议题进行了充分的研讨与交流。

## 书籍目录

Keynote and Invited Papers  
International Workshop on Rammed Earth Materials and Sustainable  
Structures & Hakka Tulou Forum 2011: Structures of  
Sustainability  
Monitoring, Damage Detection and Identification for Engineering  
Structures  
Structural Seismic Analysis and Seismic-resistant Structural  
Systems  
Composite Structures and RC Structures  
Design, Construction and Analysis of Bridge Structures  
Disaster Prevention and Mitigation for Civil Structures  
Novel Analytical and Experimental Methods for Civil  
Structures  
Reliability, Probabilistic Assessment and Uncertainty  
Evaluation

## 章节摘录

**Abstract :** The present study concerns the quantification of the environmental factors influencing the durability of concrete structures under on-site frost environments , including the number of freeze-thaw cycles , average freezing rate and time proportional coefficient of water saturation in concrete. A statistical method is put forward to get the on-site freeze-thaw cycles by using the average annual number of negative-temperature days as an index. In addition , a practical formula is obtained to predict the natural freeze-thaw cycles accordingly. Then , a conceptual approach considering the time proportion of concrete in saturated condition is proposed for general atmospheric environment. According to the average freezing rate in the freezing and thawing , the proportional coefficient of concrete damage in different freeze-thaw environments is obtained. Based on the aforementioned factors , relationship between different freeze-thaw environmental conditions is established. As

an example , procedure of predicting the equivalent number of laboratory freeze-thaw cycles from on-site freeze-thaw cycles is given. Thus , the relationship between on-site environment and indoor experiment is established. **Keywords :** Concrete durability , number of freeze-thaw cycles , time period of saturation , proportional coefficient of concrete damage , equivalent laboratory freeze-thaw cycle number 1

**INTRODUCTION** Concrete structures built in frost environment , subjected to iteration of freezing and thawing , may suffer serious durability problems. Concrete damage induced by freezing and thawing can be classified two types : internal damage and surface damage ( Lay et al. , 2003 ) . Internal damage occurs when pore water inside the concrete freezes. Water expands when it freezes , and then the concrete cracks as a result of the expansion stress. Surface damage is common in concrete structures subjected to the combined action of freezing-thawing and salt solution which leads to concrete scaling at local weak places. The study focuses on the first kind of damage-the freezing and thawing without participation of salt. In different freeze-thaw environments , the number of freeze-thaw cycles , the average freezing rate , the lowest freezing temperature and the proportional coefficient of water saturation time for concrete during the freezing and thawing are different. With these differences , on site data in one environment can't be used as a reference for the prediction and assessment of the freeze-thaw durability of concrete structures in another environment. Also , because of the huge differences between field and laboratory freeze-thaw environment , a number of standard freeze-thaw test data is difficult to be applied directly to predict the on-site freeze-thaw durability of concrete. With these considerations , relationship between different freeze-thaw environments including the relationship between field and laboratory environments is necessary for the qualification and distinction of the effect degree of different freeze-thaw environments. With the discussions of freeze-thaw cycle number , freezing rate and time period of freezing , time of concrete in saturated condition , the quantification of the environmental factors influencing the durability of concrete structures under on-site frost environments are obtained. Accordingly , relationship between different freeze-thaw environmental conditions is established. The result is useful for predictions , assessments and quantitative design of concrete durability. Obviously , the test data in one specific area can be used in other areas with different environmental characteristics under the condition of lacking tested data. ....

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