

[1]林迟,欧进萍.基于结构全寿命设计需求的冻融作用谱模型与参数[J].自然灾害学报,2013,04:1-10.

LIN Chi,OU Jinping.Model and parameters of freeze-thaw action spectrum for the needs of structural life-cycle design[J].,2013,04:1-10.

点击复制

## 基于结构全寿命设计需求的冻融作用谱模型

《自然灾害学报》[ISSN:/CN:23-1324/X] 期数: 2013年04期 页码: 1-10 栏目: 出版

日期: 2013-09-30

Title: Model and parameters of freeze-thaw action spectrum for the needs of structural life-cycle design

作者: [林迟<sup>1</sup>](#); [欧进萍<sup>1; 2</sup>](#)

1. 大连理工大学 土木工程学院, 辽宁 大连 116023;
2. 哈尔滨工业大学 土木工程学院, 黑龙江 哈尔滨 150090

Author(s): [LIN Chi<sup>1</sup>](#); [OU Jinping<sup>1; 2</sup>](#)

1. School of Civil Engineering, Dalian University of Technology, Dalian 116023, China;
2. School of Civil Engineering, Harbin Institute of Technology, Harbin 150090, China

关键词: [全寿命设计](#); [冻融循环](#); [冻融作用谱](#); [半边正态分布](#)

Keywords: [life-cycle design](#); [freeze-thaw cycle](#); [freeze-thaw action spectrum](#); [half-normal distribution](#)

分类号: TU375

DOI: -

文献标识码: -

摘要: 冻融作用谱模型应由年平均冻融循环次数和不同冻结温度的冻融循环发生概率分布两者组成。从结构全寿命设计需求考虑,依据全国130余个气象站点1951-2010年的温度数据,对我国冻融循环的发生概率分布进行分析。以日最高温度高于0℃,最低温度低于-3℃为冻融循环发生条件,选用(左)半边正态分布对哈尔滨地区温度数据进行分析,编制该地区的冻融作用谱,同时利用北京、呼和浩特、伊宁和郑州等典型地区的气象数据检验半边正态分布的适用性;最后给出我国主要地区的冻融作用谱参数,并对混凝土结构的冻融损伤预测进行举例分析。结果表明:我国绝大多数地区的冻融作用谱都能用半边正态分布表示;所提方法能够清楚描述我国各地区冻融作用的实际强弱情况,也可直接为进行结构全寿命期的性能退化预测提供所需的冻融作用参数。

Abstract: The model of freeze-thaw action spectrum should include the annual average number of freeze-thaw cycle and the occurrence

导航/NAVIGATE

[本期目录/Table of Contents](#)

[下一篇/Next Article](#)

[上一篇/Previous Article](#)

工具/TOOLS

[引用本文的文章/References](#)

[下载 PDF/Download PDF\(2669KB\)](#)

[立即打印本文/Print Now](#)

[推荐给朋友/Recommend](#)

统计/STATISTICS

[摘要浏览/Viewed](#) 165

[全文下载/Downloads](#) 119

[评论/Comments](#)



probability distribution of freeze-thaw cycle at different frozen temperatures. Due to the structural life-cycle design requirements, the probability of freeze-thaw cycle in China were analyzed employing the temperature data of more than 130 meteorological stations from 1951 to 2010. The freeze-thaw action spectrum of Harbin was drawn through data fitting with the (left) half normal distribution, under the freeze-thaw cycle occurrence condition of daily maximum temperature higher than  $0^{\circ}\text{C}$  and the minimum temperature lower than  $-3^{\circ}\text{C}$ . The weather data of Beijing, Hohhot, Yining and Zhengzhou were investigated as well to verify the applicability of the half-normal distribution. At last, the parameters of freeze-thaw action spectrum of the main regions of China were given, and an express of freeze-thaw damage prediction of concrete structures were also given. Results show that the half normal distribution is suitable to compile freeze-thaw action spectrum for most areas of China. The method proposed herein could describe the strength of freeze-thaw action clearly, and could provide model parameters directly for the need of prediction of structural life-cycle design.

---

#### 参考文献/REFERENCES

- [1] 国家自然科学基金委员会工程与材料科学部. 学科发展战略研究报告(2006年-2010年): 建筑、环境与土木工程 II: 土木工程卷[R]. 北京: 科学出版社, 2006: 26-37. The Department of Engineering and Materials Sciences of NSFC. Research Report on the Discipline Development Strategy (2006-2010): Construction, Environment and Civil Engineering II: Civil Engineering Volume. Beijing: Science Press, 2006: 26-37.(in Chinese)
- [2] 金伟良, 吕清芳, 赵羽习, 等. 混凝土结构耐久性设计方法与寿命预测研究进展[J]. 建筑结构学报, 2007, 28(1): 7-13. JIN Weiliang, LV Qingfang, ZHAO Yuxi, et al. Research progress on the durability design and life prediction of concrete structures [J]. Journal of Building Structures, 2007, 28(1): 7-13.(in Chinese)
- [3] 李金玉, 彭小平, 邓正刚, 等. 混凝土抗冻性的定量化设计[J]. 混凝土, 2000(9): 61-65. LI jinyu, PENG Xiaopin, DENG zhenggang, et al. Quantitative design on the frost-resistance of concrete [J]. Concrete, 2000(9): 61-65.(in Chinese)
- [4] 李金玉, 曹建国, 徐文雨, 等. 混凝土冻融破坏机理的研究[J]. 水利学报, 1999(1): 41-49. LI jinyu, CAO