

学术论文

腐蚀钢绞线预应力混凝土梁的受弯性能试验研究

李富民;袁迎曙;

中国矿业大学深部岩土力学与地下工程国家重点实验室;

摘要: 为研究腐蚀钢绞线预应力混凝土梁的受弯性能退化特征,制作了5根先张预应力混凝土梁试件和5根钢管抽芯成孔后张预应力混凝土梁试件,并对每组中的4根梁进行了为期13个月的掺盐加速腐蚀(腐蚀率0.94%~2.87%),然后对10根梁进行了3分点静载试验。试验及分析结果表明:腐蚀钢绞线预应力混凝土梁正截面会发生两种典型的受弯破坏方式,一种是传统的适筋破坏(力筋强化→混凝土压碎),因腐蚀尚未影响到预应力钢筋强化到混凝土压碎的完整过程,因而不会导致梁的极限承载力和变形能力降低;另一种是压碎前腐蚀钢绞线钢丝率先被拉断(断丝破坏),这种破坏会导致梁的极限承载力和变形能力发生不同程度的降低;在腐蚀率不大(小于2.87%)的情况下,腐蚀对钢绞线预应力混凝土梁的开裂弯矩、初始强化弯矩、极限弯矩以及初始强化挠度的影响都不显著,但会导致断丝破坏梁的极限挠度(断丝时)明显减小;在极限荷载之后,梁仍可以维持较高的承载能力继续承载并发展残余变形。

关键词: 预应力混凝土梁 钢绞线腐蚀 静力试验 受弯性能

Experimental study on bending property of prestressed concrete beams with corroded steel strands

LI Fumin,YUAN Yingshu(State Key Laboratory for Geomechanics and Deep Underground Engineering,China University of Mining and Technology,Xuzhou 221008,China)

Abstract: In order to study the deterioration of bending property of prestressed concrete beams under the condition of steel strands corrosion,5 pre-tensioned prestressed concrete beams and 5 post-tensioned prestressed concrete beams with knockout core pores were fabricated.Of which,4 beams of each group were mixed with salt to be corroded for 13 months(corrosion rates are from 0.94% to 2.87%).Then,all the 10 beams were subjected to loads at the 3 divided points.The experimental results and analysis indicate that,there are 2 typical bending failure modes occurring in the prestressed concrete beams with corroded steel strands.One failure mode is the conventional ductile failure with tendons hardening first in which the ultimate bending capacity and deformation property do not depress because the process from tendons hardening to concrete crushing is not deprived by corrosion.The other failure mode is that the wires of steel strands breaking before the crushing(named wire-breakage failure) in which the ultimate bending capacity and deformation property depress at different levels.Under the condition of low corrosion rate(less than 2.87%),the effects of corrosion are not significant to the cracking moment,the initial hardening moment,the ultimate moment and the initial hardening deflection in any case,but are remarkable to the ultimate deflection for the beams with wire-breakage failure.After the ultimate load,the beams still hold a relative high level of capacity to bear load and develop residual deformation.

Keywords: corrosion of steel strands static test bending property

收稿日期 2010-04-05 修回日期 2010-04-05 网络版发布日期 2010-04-05

DOI:

基金项目:

国家自然科学基金项目(50538070);; 徐州市社会发展基金项目(XM07C082)

通讯作者:

作者简介:

作者Email:

参考文献:

本刊中的类似文章

1. 刘立新;于秋波;汪小林;.500MPa钢筋预应力混凝土梁疲劳受力性能试验研究[J]. 建筑结构学报, 2008,29

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(OKB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 预应力混凝土梁
- ▶ 钢绞线腐蚀
- ▶ 静力试验
- ▶ 受弯性能

本文作者相关文章

- ▶ 李富民
- ▶ 袁迎曙

PubMed

- ▶ Article by
- ▶ Article by

(S1): 161-166

2. 罗小勇,余志武,聂建国,刘小洁.自密实预应力混凝土梁的疲劳性能试验研究[J]. 建筑结构学报, 2003,24(03): 76-81
 3. 唐昌辉,易伟建,沈蒲生,刘健行,李跃.低周反复荷载作用下无粘结部分预应力混凝土梁受弯性能的试验研究[J]. 建筑结构学报, 2003,24(01): 19-25
 4. 蓝宗建, 庞同和, 刘航, 童启明, 温峰, 严欣春.部分预应力混凝土梁裂缝闭合性能的试验研究[J]. 建筑结构学报, 1998,19(01): 0-
-