

中文力学类核心期刊
中国期刊方阵双效期刊
美国《工程索引》(EI Compendex)核心期刊(2002—2012)
中国高校优秀科技期刊

钟新谷, 舒小娟, 张昊宇. 预应力混凝土箱梁横向框架效应有限元分析[J]. 计算力学学报, 2013, 30(4): 549-553

预应力混凝土箱梁横向框架效应有限元分析

Finite element analysis on transversal frame-effect of prestressed concrete box-girder bridge

投稿时间: 2012-03-21 最后修改时间: 2012-06-19

DOI: 10.7511/jslx201304016

中文关键词: [混凝土箱梁](#) [横向框架](#) [有限单元](#)

英文关键词: [concrete box-girder](#) [transverse framing](#) [finite element](#)

基金项目: 国家自然科学基金(51178183)资助项目.

作者	单位	E-mail
钟新谷	湖南科技大学 土木工程学院, 湘潭 411201	
舒小娟	湖南科技大学 土木工程学院, 湘潭 411201	254528003@qq.com
张昊宇	湖南科技大学 土木工程学院, 湘潭 411201	

摘要点击次数: 438

全文下载次数: 185

中文摘要:

以预应力混凝土箱梁桥顶板纵向开裂为工程背景,以箱梁顶板与腹板交接处两个角点的转角为基本未知量,基于箱梁纵向一维单元,利用最小势能原理推导出箱梁横向框架效应有限元法的单元刚度矩阵,及相应的单元等效节点力,对比计算表明,该有限单元法计算精度与理论分析基本一致。实桥分析表明:现行规范计算箱梁角点弯矩相对安全,对于中点弯矩相对偏于不安全,设计过程不充分考虑混凝土箱梁横向框架效应可能导致顶板的纵向开裂。本文提出的有限单元法具有概念简单、运算速度快等优点,弥补了目前商业程序的不足,对工程设计具有一定的参考意义和推广价值。

英文摘要:

The problem of longitudinal cracking for the top slab of prestressed concrete box-girder bridge is studied by finite element method. Taking the rotational displacement at the corner of top slab and web as the basic unknown quantity, and based on the longitudinal one-dimension element of box-girder, the element stiffness matrix and corresponding equivalent nodal forces for the analysis of transversal frame-effect of box-girder were developed on the basis of minimum potential energy principle. The comparative calculation indicates that the results of the finite element method are in good accordance with those of theoretical analysis. Analysis of a practical bridge indicates that a relatively conservative result at the corner can be obtained by the method proposed in Chinese current bridge design code, while for that at the middle of the top slab, the result is relatively unsafe. Hence the top slab might crack longitudinally with the inadequacy consideration of the transversal frame-effect. The method proposed in this paper is conceptually simple and calculates fast, which can make up the inadequacy of current business software. Hence it is valuable for reference and extension in engineering design.

[查看全文](#) [查看/发表评论](#) [下载PDF阅读器](#)

关闭

您是第984172位访问者

版权所有:《计算力学学报》编辑部

本系统由北京勤云科技发展有限公司设计