



## 论文摘要

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### 钢管混凝土拱桥弹塑性极限承载力 分析的截面内力塑性系数法

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**摘要:** 结合钢管混凝土的本构关系模型, 基于修正的拉格朗日列式单元增量平衡方程, 采用单元节点截面内力塑性系数法建立了钢管混凝土空间拱单元弹塑性刚度矩阵, 按当前刚度参数法对材料非线性与几何非线性进行分析, 研究了钢管混凝土拱桥空间弹塑性稳定极限承载力非线性分析方法; 采用初始内力法考虑阶段间体系转换及弹性内力的传递, 计算分析了益阳资江三桥主孔钢管拱桥施工阶段及成桥使用阶段空间弹塑性稳定极限承载力, 探讨了仅考虑几何非线性稳定安全系数与弹塑性稳定安全系数之间的区别. 研究表明: 几组钢管混凝土轴心受压构件和偏心受压构件弹塑性稳定极限承载力与试验结果较接近, 验证了本文方法与程序正确、可靠; 对于钢管混凝土拱桥, 弹塑性稳定极限承载力比仅考虑几何非线性的弹性失稳临界力要小, 必须考虑弹塑性对稳定安全系数的影响.

**关键字:** 钢管; 混凝土; 拱桥; 承载力; 稳定安全系数; 塑性系数法

### Plastic-coefficient method for space elasto-plastic ultimate load analysis of CFST arch bridge

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**Abstract:** Combined with the concrete constitute model of concrete filled steel tubular(CFST), and with the basis of the UL formula of element incremental equilibrium, the elasto-plastic matrix of space CFST beam element was established by use of plastic-coefficient method of element section force, where the program of space elastoplastic stability analysis of CFST arch bridge was also developed. The reliability of the present method and program was tested, showing that the analysis results are in good agreement with the experiment results from references. With the influences of system transferring and initial elastic forces on the structures taken into account, the space elasto-plastic stability ultimate load analysis of the main span CFST arch bridge of Yiyang Zijiang 3<sup>rd</sup> bridge was fulfilled where the difference between the elasto-plastic stability ultimate load and elastic stability ultimate load was also discussed. The results provide a reference for design.

**Key words:** steel tube; concrete; arch bridge; load; stability safety factor; plastic-coefficient method

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