电网技术 2010, 34(2) 194-199 DOI: ISSN: 1000-3673 CN: 11-2410/TM

电网建设

输电铁塔冷弯角钢构件轴心受压承载力分析及试验研究

杨风利[1],韩军科[1],杨靖波[1],李振宝[2]

1．中国电力科学研究院，北京市 宣武区 100055；2．北京工业大学 建工学院，北京市 朝阳区 100022

摘要：

在输电线路铁塔应用冷弯型钢，可以提高我国输电铁塔设计水平，降低钢材用量。结合输电铁塔的结构特点，选取不同截面、不同长细比的冷弯角钢构件进行轴心受压承载力试验和有限元分析，得到了输电铁塔用冷弯角钢轴心受压构件的荷载—应变发展规律和极限承载力，并与现行设计规范承载力计算值进行对比。分析结果表明，现行规范体系不适合我国输电铁塔冷弯型钢轴心受压构件的强度设计。通过对试验和理论分析结果进行拟合，确定了输电铁塔冷弯型钢轴心受压构件稳定系数曲线，提出了输电铁塔冷弯型钢构件承载力计算的修正意见，为冷弯型钢在我国输电铁塔中的应用提供了参考和依据。

关键词：

Analysis and Experimental Study on Ultimate Bearing Capacity of Structural Members of Cold-Bending Angle Steel for Transmission Tower Under Axial Compression

YANG Feng-li1, HAN Jun-ke1, YANG Jing-bo1, LI Zhen-bao2

1.China Electric Power Research Institute, Xuanwu District, Beijing 100055, China; 2. School of Architecture and Civil Engineering, Beijing University of Technology, Chaogyang District, Beijing 100022, China

Abstract:

With the application of cold-formed steel in transmission tower, the design level of transmission tower can be improved and the steel consumption of transmission tower can be decreased in China. According to the structural characteristics of transmission tower，types of cold-formed angles with different sections and slenderness ratios are selected. Experiments and finite element analysis for the ultimate bearing capacities of the axial compression cold-formed angles in transmission tower were carried out，and the force-strain curves as well as ultimate bearing capacities of experimental members were obtained. The experimental ultimate bearing capacities were compared with those calculated using the applicable standards，and it shows that the applicable standards aren't adaptive to the strength design of axial compression cold-formed members of transmission tower in China. Through the experimental and analytical results，the stability coefficient fitting curve for cold-formed members in transmission tower was determined. Some modification suggestions were proposed for the calculation of axial compression cold-formed angles，which provides reference and basis for the application of cold-formed steels in transmission tower.

Keywords:

收稿日期 2009-02-18 **修回日期** 2009-10-22 **网络版发布日期** 2010-02-11

DOI:

基金项目:

基金项目：国家电网公司科技项目(SGKJ2007[117])。

通讯作者: 杨风利

作者简介: 杨风利(1980—)，男，工程师，研究方向为输电线路结构分析与振动控制、新材料在输电铁塔中的应用，E-mail：yangfl1@epri.sgcc.com.cn；杨靖波(1973—)，男，高级工程师，研究方向为输电线路结构分析与振动控制；韩军科(1979—)，男，工程师，研究方向为输电线路结构抗风与抗震；李振宝(1962—)，男，博士生导师，研究方向为现代结构性能与振动控制。

作者Email: yangfl1@epri.ac.cn

参考文献：

[1] 杨靖波，李茂华，杨风利，等．我国输电线路杆塔结构研究新进展[J]．电网技术，2008，32(22)：77-83．Yang Jingbo，Li Maohua，Yang Fengli，et al．New advances in the study of transmission tower structure of China[J]．Power System Technology，2008，32(22)：77-83(in Chinese)． [2] 李正良，刘红军，张东英，等．Q460高强钢在1000kV杆塔的应用[J]．电网技术，2008，32(24)：1-5． Li Zhengliang，Liu Hongjun，Zhang Dongying，et al．Application of high-strength steel Q460 in 1 000 kV transmission towers[J]．Power System Technology，2008，32(24)：1-5(in Chinese)． [3] 李茂华，李正，任吉华，等．500 kV输电线路杆塔结构的可靠性分析[J]．电网技术，2008，32(23)：91-94． Li Maohua，Li Zheng，Ren Jihua，et al．Reliability analysis on tower structure for 500 kV transmission lines[J]．Power System Technology，2008，32(23)：91-94(in Chinese)． [4] 郭日彩，许子智，李喜来，等．110~500 kV输电线路典型设计[J]．电网技术，2007，31(1)：56-64． Guo Ricai，Xu Zizhi，Li Xilai，et al．Typical design of transmission lines within voltage grades from 110 kV to 500 kV and its application[J]．Power System Technology，2007，31(1)：56-64(in Chinese)． [5] GB 50018—2002，冷弯薄壁型钢结构技术规定[S]． [6] 何长华．高强冷弯型钢在输电铁塔上应用可行性的探讨[J]．特种钢结构，2004，19(5)：35-37．He Changhua．Feasibility discussion on application of high strength cold-formed section steel in transmission tower[J]．Steel Construction, 2004，19(5)：35-37 (in Chinese)． [7] Mohan S J，Shabeen S R，Knight G M S．Behavior of cold formed lipped angles in transmission line towers[J]．Thin-Walled Structures， 2006(44)：1017-1030． [8] Ben Y，Kim J R R．Behavior of cold-formed singly symmetric columns[J]．Thin-Walled Structures，1999(33)：83-102． [9] Ben Y，Ehab E．Buckling analysis of cold- formed steel lipped angle columns[J]．Journal of Structural Engineering，1999，131(10)：1570-1579． [10] Ben Y．Experimental investigation of cold-formed steel lipped angle concentrically loaded compression members[J]．Journal of Structural Engineering，2005，131(9)：1390-1396． [11] Popovic D，Hancock G J，Rasmussen K J R． Axial compression tests of cold-formed angles[J]．Journal of Structural Engineering，1999，125(5)：515-523． [12] ASCE110—97，Design of latticed steel transmission structures[S]． [13] DL/T 5154—2002，架空送电线路杆塔结构设计技术规定[S]． [14] 薄壁型钢结构技术规范编写组．冷弯薄壁型钢轴心受压构件的稳定性计算[J]．建筑结构学报，1991，12(4)：1-10． Revision Group of the Specification for Design of Thin-walled Steel Structures．Calculation of stability of axially loaded compression members made of cold-formed thin-walled steel sections[J]．Journal of Building Engineering，1991，12(4)：1-10(in Chinese)． [15] 国网北京电力建设研究院．耐候钢及冷弯型钢在输电铁塔中的应用研究[R]．北京：国网北京电力建设研究院，2007．

本刊中的类似文章
