بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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MONA MAGHRABY

AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Structural Engineering

Behavior of steel Multi-planar tubular joints

A Thesis submitted in partial fulfilment of the requirements of the degree of Master of Science in Civil Engineering

(Structural Engineering)

by

Ahmed Amr Kadry Shaheen

Bachelor of Science in Civil Engineering

(Structural Engineering)

Faculty of Engineering, Future University in Cairo, 2017

Supervised By

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Cairo - (2021)

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Examiners' Committee

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Statement

This thesis is submitted as a partial fulfillment of Master of Science in Civil Engineering Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Thesis Summary

Multi-planar tubular joints became widely used in steel structures especially in industrial and offshore project. However, the current design procedures are still not accurate enough and depend on studying each plan separately and adjust the joint capacity using some correction factors. The aim of this research is to present a mathematical formula to calculate the capacity of symmetrically loaded multi-planar KK joint.

A verified ANSYS model was used to generate 172 records for parametric study with different geometry, member sections and material properties. The general mode of failure was found to be chord bending (buckling) at the intersection area between the chord and the braces

The outputs of the parametric study were analyzed using (GRG) "Generalized Reduced Gradient" (a nonlinear mathematical solving technique depends on changing the values of the considered variables gradually while monitoring the governing conditions until the partial derivatives of the target function equals zero) to develop the final formula. The developed formula consists of two equations based on failure mode. The results of the developed formula were compared with experimental test results and showed average accuracy of 92.5%.

Key words: Steel structures, Hollow steel sections, Tubular KK-Joints, Multi-planar connection, Unstiffened, GRG.

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