



Cairo University

# **FATIGUE BEHAVIOR OF DENTED SUBSEA STEEL PIPELINES**

By

**Mohamed Mohamed Said Mohamed Eladly**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**DOCTOR OF PHILOSOPHY**  
in  
**Structural Engineering**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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Under the Supervision of

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**Title of Thesis:** **FATIGUE BEHAVIOR of DENTED SUBSEA STEEL PIPELINES**

**Key Words:** residual stress-fatigue-sea storm waves- lifetime- steel pipeline

**Summary:**

Assessment of the subsea steel indented pipelines, has been the subject of considerable study over the last years. In this research, a parametric study has been conducted to evaluate the effect of indentation on the induced residual stresses. An equation to predict the value of the residual stress has been formulated based on the parametric study. This equation has taken into consideration the main controlling parameters with good agreement with the experimental results. In addition and in order to give a full assessment for the dented pipeline, Three cases of study have been performed on real sea storm waves and soil conditions at the Arabian Gulf region (United Arab Emirates) to evaluate the fatigue lifetime considering the dent effect

## **Disclaimer**

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.  
I further declare that I have appropriately acknowledge all sources used and have cited them in the references section.

Name:

Date:

Signature:

## **ACKNOWLEDGEMENT**

The author would like to extend his sincerest gratitude to his family and his wife, Dr.

Sarah Sameh.

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## LIST OF SYMBOLS

***a***                      Half dent length (m).