

**ANALYSIS AND DESIGN OF WALLS AND WALL
PROTECTION SYSTEMS SUBJECT TO BLAST USING
THE APPLIED ELEMENT METHOD**

By

Tarek Mohamed Mohamed El-Kadry Mohamed Osman

**A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of**

**MASTER OF SCIENCE
In
STRUCTURAL ENGINEERING**

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the supervision of

Prof. Dr. Sherif Ahmed Mourad

Professor of Steel Structures and Bridges
Structural Engineering Department
Faculty of Engineering
Cairo University

Dr. Ahmed Amir Khalil

Associate Professor
Structural Engineering Department
Faculty of Engineering
Cairo University

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Approved by the
Examining Committee

Prof. Dr. Sherif Ahmed Mourad
Structural Engineering Department
Faculty of Engineering, Cairo University

Prof. Dr. Hamed Mohamed Hadhoud
Structural Engineering Department
Faculty of Engineering, Cairo University

Prof. Dr. Mostafa Kamel Zidan
Structural Engineering Department
Faculty of Engineering, Ain Shams University

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GIZA, EGYPT
2016

Engineer: Tarek Mohamed Mohamed El-Kadry
Mohamed Osman

Date of Birth: 1/10/1981

Nationality: Egyptian

E-mail: tarek_kungfu@hotmail.com

Phone: 01006070329

Address: 4 khairy street, Kobri El-Koba, Cairo

Registration Date: 1/10/2009

Awarding Date: / / 2016

Degree: Master of science

Department: Structural Engineering



Supervisors: Prof. Dr. Sherif Ahmed Mourad
Dr. Ahmed Amir Khalil

Examiners: Prof. Dr. Sherif Ahmed Mourad
Prof. Dr. Hamed Mohamed Hadhoud
Prof. Dr. Mostafa Kamel Zidan (Structural Engineering Department-
Faculty of Engineering-Ain Shams Univercity)

Title of Thesis: Analysis and Design of Walls and Wall Protection Systems
Subject To Blast Using the Applied Element Method

Key Words: (Petrochemical Structures, Vapor Cloud Explosions, Protection Walls,
Blast Loads and AEM)

Summary:

Blast loading due to vapor cloud explosions is a common case of loading in the design of petrochemical structures. Most blast design codes allow the use of simplified single degree of freedom (SDOF) analyses to design structures subjected to blast loading. However, using SDOF simplification is always accompanied with overly conservative assumptions. Thus, performing advanced three-dimensional structural analysis can lead to reduction in the straining actions and deflections resulting from the analysis. In this study, the effect of using three dimensional Applied Element analyses for walls subject to blast loading was highlighted using the software (ELS). The program was verified by comparing the results to results from experimental testing. Also an applied element model was developed for a building was designed to resist blast loading using the SDOF method. The AEM results show noticeable reduction in walls deflection and rotation, and a cost saving in wall materials was achieved.

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