
# HARMONIC RESONANCE OVERVOLTAGE DURING MAIN POWER TRANSFORMER ENERGIZATION IN GRID-CONNECTED WIND FARMS

By

**Ahmed Fouad Ibrahim Ahmed**

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

**Electrical Power and Machines Engineering**

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

**Prof. Dr. Mahmoud Ibrahim Gilany**

Electrical Power and Machines Department
Faculty of Engineering, Cairo University

**Dr. Mostafa Ahmed Elshahed**

Electrical Power and Machines Department
Faculty of Engineering, Cairo University

**Dr. Mahmoud Mohammed Sayed**

Electrical Power and Machines Department
Faculty of Engineering, Cairo University

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**Approved by the**
**Examining committee**

| | |
|---|---|
| **Prof. Dr. Mahmoud Ibrahim Gilany** | Thesis Main Advisor |
| **Prof. Dr. Abd Elbary Mohammed Mahdy** | Internal Examiner |
| **Prof. Dr. Salem Mahmoud Elkhodary**<br>Faculty of Engineering, Ain Shams University | External Examiner |

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY**
**GIZA, EGYPT**
**2017**

**Engineer:** Ahmed Fouad Ibrahim Ahmed
**Date of Birth:** 1 / 3 / 1987
**Nationality:** Egyptian
**E-mail:** Fouad_eng16@yahoo.com
**Phone. :** +20 / 1018156166 -
+20 / 1117307911
**Address:** Egypt – Minia el-kamh, Sharkia

**Registration Date:** 01 / 10 / 2012
**Awarding Date:** / / 2017
**Degree:** Master of Science
**Department:** Electrical Power and Machines Engineering

**Supervisors:**

Prof. Dr. Mahmoud Ibrahim Gilany
Dr. Mostafa Ahmed Elshahed
Dr. Mahmoud Mohammed Sayed

**Examiners:**

Prof. Dr. Salem Mahmoud Elkhodary (External Examiner, Professor at Ain Shams University)
Prof. Dr. Abd elbary Mohammed Mahdy (Internal Examiner)
Prof. Dr. Mahmoud Ibrahim Gilany (Thesis Main Advisor)

**Title of Thesis:**

Harmonic Resonance Overvoltage during Main Power Transformer Energization in Grid-connected Wind Farms

**Key Words:**

Transformer energization, Harmonic resonance overvoltage, Natural frequency, Wind farm feeders, Grid-connected wind farms.

**Summary:**

This thesis introduces a new study about the produced harmonic resonance overvoltage (HRO) during the energization of the main power transformers in grid-connected wind farms. The thesis studies some affecting factors on the produced HRO. It investigates the effect of the lengths of the overhead transmission lines (OHTLs) and the unloaded on-line transformer on the HRO. In addition, it investigates the effect of the wind farm feeders, connected to the secondary side of the on-line transformers, on the HRO.

# Acknowledgments

*"All the praises and thanks be to **Allah**, Who has guided us to this, and never could we have found guidance, were it not that Allah had guided us"*

Then, I would like to express my sincere gratitude and appreciation to my supervisors; Prof. Dr. Mahmoud Gilany, Dr. Mostafa Elshahed, and Dr. Mahmoud Sayed (Cairo University) for their valuable advice, suggestions, guidance, and precious comments that improved the whole thesis and also their patience and encouragement throughout the period of the research.

Furthermore, I would like to express my deepest gratitude and thanks to my brother Eng. Ibrahim Fouad, my dear friend Eng. Osama Salah for their support, strong encouragement, and help.

A special thanks to Eng. Abd_Elfatah Helmy and Eng. Alaa Gamal (Zafarana transformer substation) for their help and kind support.

Finally, I can't forget to express my deep thanks and sincere gratitude to my parents, and my wife, for their patience, strong encouragement and kind support.

## Dedication

*This work is gratefully dedicated to:*

*My parents, my wife, and my little son Youssef*

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