



Cairo University

# **MODELLING AND TRANSIENT ANALYSIS OF CAPACITOR SWITCHING CONNECTED TO ELECTRICAL WIND TURBINE SYSTEM USING SIMULINK SOFTWARE**

By

**Mohamed Salah Mahmoud Hussein**

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. Mohamed Mamdouh Abdel Aziz**

**Prof. Dr. Hosam Kamal Mohamed**

**Youssef**

.....  
**Electrical Power and Machines department**  
**department**

.....  
**Electrical Power and Machines**

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**Approved by the Examining Committee:**

---

**Prof. Dr. Hosam Kamal Mohamed Youssef, Thesis advisor**  
**Faculty of Engineering , Cairo University**

---

**Prof. Dr. Essam Eldien Mohamed Abo Al Zahab, Internal Examiner**  
**Faculty of Engineering, Cairo University**

---

**Prof. Dr. Said Wahsh, External Examiner**  
**Electronics Research Institute - Dokki**

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY**

**GIZA, EGYPT**

**2016**

**Engineer:** Mohamed Salah Mahmoud Hussein  
**Date of Birth:** 1 /11 /1984  
**Nationality:** Egyptian  
**E-mail:** salah\_msmh@yahoo.com  
**Phone:** 01007095294  
**Address:** 7 st. Mahmoud Aref , Elshishini,Faisal , Giza  
**Registration Date:** 1 / 10 / 2009  
**Awarding Date:** / /  
**Degree:** Master of Science  
**Department:** Electrical Power and Machines Engineering



**Supervisors:** Prof. Dr. Hosam kamal Mohamed Youssef  
Prof. Dr.Mohamed Mamdouh Abd Alaziz (God bless his soul)

**Examiners:** Prof. Dr. Said Abdelmoniem Wahsh (Electronics research center, Dokki)  
Prof. Dr. Essam Mohamed Abo Elzahab  
Prof. Dr. Hosam kamal Mohamed Youssef

**Title of Thesis:**  
**Modelling and Transient Analysis of Capacitor Switching Connected to Electrical Wind Turbine System Using Simulink Software**

**Key Words:**  
**Wind turbines, Power Quality, Transient Overvoltage, Zero-Crossing technique, Modeling and Simulations using Matlab**

**Summary:**

The quality of electric power is very important topic. It has been a major topic of research due to problems, which result in case of poor power quality, which can cause heavy financial losses in different fields. One of the most important aspects of poor power quality is transient which is generated, among other cases, as a result of capacitor switching such as in wind turbine system. In this work the transient over voltage and inrush current resulted from capacitor switching are studied by building a model using matlab Simulink for wind turbine system. To eliminate the originated transients, the synchronous switching technique is used in this work. The simulation shows a significant decrease in the values of overvoltage and inrush current.

# ACKNOWLEDGMENTS

I am exceedingly grateful to Allah who gave me the opportunity and ability to complete this thesis. My sincere acknowledgement goes to Prof.Dr. Hosam kamal my supervisor, who guided and supervised me during this study. His kindness, understanding, encouragement, and critically constructive discussions have supported me greatly and contributed to constructing and completing this thesis. I am also thankful to Prof.Dr. Mamdouh AbdelAziz, my co-supervisor, for his advice and comments, particularly in the early stages of this thesis, before his death.

I would like to thank my family for their words of great inspiration and encouragement. Also, I would like to thank all my colleagues for their support to me



## DEDICATION

*I dedicate this thesis*  
*To*  
*My Father & Mother*  
*Salah Feryal*

*My Sisters*  
*Hoda Doaa*

*My Brother*  
*Ahmed*

*For their love, support and encouragement which  
make me able to get such success.*





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