

الآية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿أَمَّنْ يَهْدِيكُمْ فِي ظُلُمَاتِ الْبَرِّ وَالْبَحْرِ وَمَنْ يُرْسِلُ  
الرِّيَّاحَ بُشْرًا بَيْنَ يَدَيْ رَحْمَتِهِ ۖ أَلَيْهَ مَعِ اللَّهُ ۚ تَعَالَى  
اللَّهُ عَمَّا يُشْرِكُونَ﴾

صدق الله العظيم

النمل ٦٣

# Dedication

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*for my dears' father and  
mother, whose give me the  
experiences and love in live.*

*for my dear husband , who  
gives me good environment .*

*for my brothers and sister,  
whose give me there attention  
& encouragement.*

*for my colleagues, who give  
me there hands' to continue.*

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# Abstract

Today, all the world direct towards renewable sources, because it is considered a safe energy. As a result, now the studies concentrate about the reliability and continuity of the renewable energy. Though, this thesis presents a recovery strategy that enables the system of HVDC transmission systems based on voltage source converter, which transfer electrical power from the wind turbines to the grid, to ride-through different positions of AC faults with minimum current and voltage stresses on the converter switching devices. Issue such as control strategies for a VSC-HVDC transmission system connecting offshore wind farms to the power network is discussed. A reduced network model has been implemented in MATLAB/ SIMULINK to assess control performance during the fault.

# مستخلص

كل العالم اليوم يتجه نحو استخدام مصادر الطاقة البديلة لأنها تعتبر من الطاقات الآمنة. وبما أن العالم اتجه إلي توليد الطاقة الكهربائية باستخدام طاقة الرياح، لذلك ركزت معظم الدراسات الحالية علي موثقيه واستمرارية الطاقة المتجددة. لذلك هذا البحث تناول الاستراتيجيه التي تمكن منظومة قدرة كهربائية لنقل الطاقة الكهربائية من محطات توليد الكهرباء بطاقة الرياح إلي الشبكة العامة عبر خط نقل الجهد العالي للتيار المستمر لمبدلات الجهد، بعد أن تتعرض المنظومة المقترحة إلي أعطال التيار المتردد من مواقع مختلفة بأقل اجهادات للجهد والتيار علي معدات مفاتيح المبدلات. قضية مثل إستراتيجية التحكم لمبدلات القدرة الكهربائية للجهد العالي للتيار المستمر التي توصل مزارع توربينات الرياح بالشبكة الكهربائية نوقش. نفذ ذلك النموذج باستخدام برنامج الماتلاب \سيمولنك لتقييم الأداء أثناء الأعطال.

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# Table of Abbreviations

|      |                                      |
|------|--------------------------------------|
| HVDC | High Voltage Direct Current          |
| VSC  | Voltage Source Converter             |
| FERC | Federal Energy Regulatory Commission |
| LCC  | Line Commutated Converter            |
| CCC  | Capacitor Commutation Converter      |
| FSIG | Fixed Speed Induction Generator      |
| DFIG | Doubly-Fed Induction Generator       |
| DTC  | Direct Thermocouple Control          |
| PCC  | Predictive Current Control           |
| SVM  | Space Vector Modulation              |
| NPC  | Neutral Point Clamped                |
| M2C  | Modular Multilevel Converter         |
| ESCR | Effective Short Circuit Ratio        |
| SPWM | Sinusoidal Pulse Width Modulation    |
| PLL  | Three-Phase Locked Loop              |