



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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تم رفع هذه الرسالة بواسطة /صفاء محمود عبد الشافي

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون

أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد





# **PERFORMANCE OF HIGH VOLTAGE DIRECT CURRENT CIRCUIT BREAKER DURING AND AFTER ARC INTERRUPTION PROCESS.**

By

**Mohamed Niazi Taha Elfikky**

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  
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**Title of Thesis:**

Performance of High Voltage Direct Current Circuit Breaker during and after Arc Interruption Process.

**Key Words:**

HVDC; CB; Arc interruption; Fault; Modelling

**Summary:**

In this thesis we simulated the arc using 2 different methods to gain an inclusive view over the different factors that affect the arcing process. First, we used the MATLAB Simulink tool to simulate the arc using Mayr arc model, which gave us the current and voltage of the CB during the fault interruption process. Then we used ANSYS fluent to simulate the physical arc model which gives us a good explanation for the interaction between arc and fluid flow inside the breaker during the interruption process. We found that the interruption of the pole to ground fault would cause an immense heat to be generated leading to a decrease in dielectric strength of the SF<sub>6</sub> gas after the arc is interrupted leading to a discharge around the hollow contact, we also found that the decrease in solid contact diameter would cause a decrease in interruption capabilities of the CB.

## **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 acknowledged all sources used and have cited them in the references section.

Name:           Mohamed Niazi Taha Elfikky                      Date:    /    /2022

Signature:

## **Dedication**

This work is dedicated to my parents, who taught me that there's never an impossible for those who try.

## **Acknowledgments**

First of all, thanks to Allah who supported and strengthened me in all of my life and in completing my studies for Master of Science (M.Sc.) degree.

I would like to deeply express my thanks and gratitude to my supervisors, Prof. Ahdab Elmorshidy and Prof. Mohammed El-Shahat, electrical Power and Machines engineering, Faculty of Engineering, Cairo University, for their faithful supervision, enormous efforts and their great patience during the period of research.

Finally, I would like to thank my family for their great inspiration, Kind support and continuous encouragement.



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