

**EFFECTS OF CONVECTION ON  
MHD FLOW AND HEAT TRANSFER OVER  
A RADIALY STRETCHING DISK**

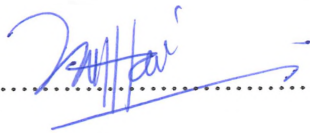
**NUR ILHANNI BINTI ROSLAN  
SITI NOR ASIAH BINTI AB TALIB**

**Thesis Submitted in Fulfillment of the Requirement for  
Bachelor of Science (Hons.) Computational Mathematics in the  
Faculty of Computer and Mathematical Sciences  
Universiti Teknologi Mara**

**July 2019**

## DECLARATION BY CANDIDATE

I certify that this report and the project to which it refers is the product of my own work and that any idea or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline.



.....  
NUR ILHANNI BINTI ROSLAN  
2016284394



.....  
SITI NOR ASIAH BINTI AB TALIB  
2016299172

DATE: JULY 11, 2019

## ABSTRACT

This study sought to investigate the effects of magnetic field and convection on a steady magnetohydrodynamic (MHD) flow and heat transfer past a radially stretching disk. Mathematical formulation of simplified Navier-Stokes equations is made in the presence of a few parameter such as magnetic field and buoyancy. In the analysis, the governing partial differential equations (PDEs) are transformed into a set of ordinary differential equations (ODEs) by a similarity transformation. The transformed equations then are solved numerically by using Keller-Box scheme in MATLAB which consist of three method that are finite difference method, Newton's method and block elimination method. The numerical solutions are obtained for the heat transfer, the rate skin friction coefficient, velocity and temperature profiles are being compared with the previous research for the purpose of accuracy. The effects of magnetic field and convection, suction on the shear stress and heat transfer are analysed and discussed. It was found that the skin friction coefficient decreases with the increasing values of buoyancy parameter,  $L$  while heat transfer remained the same.

# TABLE OF CONTENTS

DECLARATION BY SUPERVISOR	ii
DECLARATION BY CANDIDATE	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
LIST OF TABLE	x
LIST OF FIGURE	xi
LIST OF ABBREVIATION AND SYMBOL	xii
CHAPTER 1: INTRODUCTION OF RESEARCH	1
1.1 Introduction	1
1.2 Historical Background	1
1.3 Research Background	2
1.4 Problem Statement	4
1.5 Objective of The Research	5
1.6 Scope of The Research	5
1.7 Significance of the Research	6
1.8 Important Parameters	6
1.8.1 Eckert number	6
1.8.2 Prandtl number	7
1.8.3 Magnetic parameter	8
1.8.4 Grashof Number	9
1.8.5 Local Reynolds number	10
1.8.6 Skin Friction Coefficient	10

1.8.7	Local Nusselt number	11
1.8.8	Buoyancy Parameter	11
1.9	Organization of Report	11
CHAPTER 2: METHODOLOGY		13
2.1	Introduction	13
2.2	Literature Review	13
2.2.1	Rotating / Radially Disk	14
2.2.2	Magnetohydrodynamic (MHD) flow	16
2.2.3	Heat Transfer	17
2.2.4	Mixed Convection	18
2.3	Definition of Terms and Concepts	19
2.4	Research Step	21
2.4.1	Topic Selection	22
2.4.2	Understanding the Related Governing Equation and Boundary Condition	22
2.4.3	Introducing New Parameter by Extending the Previous Work	23
2.4.4	Transformation of Equation (PDEs) to (ODEs)	24
2.4.5	Numerical Method	26
2.4.6	Plotting the Graph	28
2.4.7	Analyse the Results	30
2.5	Conclusion	30