

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**MAXWELL HYBRID NANOFLUID ON MIXED CONVECTIVE
RADIATIVE FLOW OVER A STRETCHING PLATE WITH
NANOPARTICLE SHAPES EFFECT**

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
SUPERVISOR'S APPROVAL	ix
AUTHOR'S DECLARATION	x
ABSTRACT	xi
CHAPTER 1	1
INTRODUCTION	1
1.1 Introduction.....	1
1.2 Problem Statement	4
1.3 Objectives	5
1.4 Significant and Benefit of Study.....	5
1.5 Scope and Limitation of Study.....	6
1.6 Definition of Terms.....	7
CHAPTER 2	8
LITERATURE REVIEW	8
2.1 Literature Review.....	8
2.2 Nanofluid	8
2.3 Hybrid Nanofluid	10
2.4 Maxwell Hybrid Nanofluid.....	11
2.5 Magnetohydrodynamic (MHD)	12
2.6 Heat Transfer.....	14
2.6.1 Convection.....	15
2.6.1.1 Natural Convection.....	15
2.6.1.2 Force Convection	17
2.6.1.3 Mixed Convection	18
2.6.2 Conduction	20

2.6.3	Radiation	21
2.7	Nanoparticle Shapes.....	23
2.7.1	Effect of Nanoparticle Shapes	24
2.7.2	Application of Nanoparticle Shapes.....	25
2.8	Stretching Plate	26
2.9	Convective Boundary Condition.....	27
CHAPTER 3	29
METHODOLOGY AND IMPLEMENTATION	29
3.1	Introduction.....	29
3.2	Research Framework	29
3.3	Research Methodology	30
3.3.1	Derivation of Mathematical Model	30
3.3.2	Governing Equation	31
3.3.3	Reducing Governing Equation	36
3.3.3.1	Similarity Transformation	36
3.3.3.2	Continuity Equation	38
3.3.3.3	Momentum Equation.....	40
3.3.3.4	Energy Equation	52
3.3.3.5	Boundary Conditions.....	57
3.3.3.6	Local Skin Friction and Nusselt number	61
3.4	bvp4c Function.....	66
3.4.1	Code 1: Initial Guess Code.....	68
CHAPTER 4	70
RESULT AND DISCUSSION	70
4.1	Introduction.....	70
4.2	Validation.....	70
4.3	Effect of Parameters on Velocity and Temperature Profiles on Spherical shape of Maxwell Hybrid Nanofluid Cu-(Copper) and Al ₂ O ₃ - (Aluminium Oxide) with its Physical Interpretation on Skin Friction Coefficient and Nusselt number	71

ABSTRACT

This study explored the Maxwell hybrid nanofluid on mixed convective radiative flow over the stretching plate with nanoparticle shapes effect. This study aims to increase the efficiency of heat transfer fluids by using hybrid nanofluid. The objectives include extending a mathematical model of Maxwell hybrid nanofluid flow on a stretching plate heated by convective boundary condition and determining the impact of governing parameters on the profiles of velocity, temperature, skin friction, and the local Nusselt number. The study uses sodium alginate (NaAlg) with copper (Cu) and aluminium oxide (Al_2O_3) nanoparticles, and considers various shapes, including spherical, brick-shaped, cylindrical, and platelet-shaped nanoparticle. The governing nonlinear partial differential equations to nonlinear ordinary differential equations are converted by using similarity transformation and ordinary differential equations are solved using the bvp4c solver. MATLAB software is used for implementation. Parameters that use in this research are aligned angle of magnetic field, interaction of magnetic field, Maxwell parameter, mixed convection, stretching/shrinking parameter, radiation parameter, convection boundary condition, and volume fraction of nanoparticles. The result show that the velocity profiles increase while temperature profiles decrease for the increasing parameters aligned angle of magnetic field, interaction of magnetic field, Maxwell parameter, mixed convective, stretching/shrinking parameter and volume fraction of nanoparticle. When the radiation parameter and Biot number associated with the convective boundary condition increase, then the velocity and temperature profiles will also increase. The values of skin fiction and Nusselt number increase due to the parameters aligned angle of magnetic field, interaction of magnetic field, maxwell parameter, radiation parameter and convection boundary condition increase except for the parameters stretching/ shrinking parameter and volume fraction of nanoparticle. Therefore, the skin friction and Nusselt number have different values for all the nanoparticles shapes. Spherical nanoparticles demonstrate the highest velocity and temperature profiles, followed by bricks, cylindrical, and platelet shapes.