

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**HEAT TRANSFER EFFECT ON MHD
BOUNDARY LAYER FLOW OVER A
NON-LINEAR SHRINKING SHEET**

MOHD SYAFIQL SYAMIL BIN MOHD SOFIAN 2014409952

MOHD HAKIMI BIN ITAM 2014252596

MUHD FAEZIE BIN MOHD SABRY 2014484494

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ABSTRACT

Over the years, the demands for studies of boundary layer flow has been increasing significantly as there are many practical industrial applications in engineering processes can get major benefits from the research since the quality of products such as copper wire and papers are depending on the heat transfer and flow field. This study is focusing on the effect of heat transfer on the flow of MHD boundary layer on a non-linear stretching or shrinking sheet. This project analyze the MHD fluid's boundary layer flow on a shrinking sheet and study the effects of Prandtl numbers, magnetic parameter and velocity exponential parameter on the temperature and velocity profile. The non-linear ordinary equations will be solved using Maple 18. The results obtained show that the thermal boundary layer decreases as the Prandtl numbers, magnetic parameter and velocity exponential parameter increase. The fluid velocity profiles increases when higher magnetic parameter or velocity exponential parameter increased. The fluid velocity profiles is not affected by Prandtl numbers.

1. INTRODUCTION

1.1 Introduction

Heat transfer occurs when thermal energy is shifting between two systems in different temperature. The process occurs in everything from natural phenomenon such as the loss of heat from living organisms' body to the surrounding, to numerous industrial technologies such as cooling circuits in automotive industry and invention of ovens and household heaters in home appliance. The heat can be transferred in three different conditions; conduction, convection and radiation. The conduction's condition happen when the heat is exchanged between a directly contacted objects. Convection occurs when the transfer of heat happened with the help of fluid's movement while the process of heat transfer directly without any help of any medium such as the heat that is released from sun is known as thermal radiation.

The flow of boundary layer on a shrinking sheet has been studied widely by many researchers and scientists all over the globe since the importance of the study towards various industrial and engineering applications. Boundary layer is first proposed by Ludwig Prandtl, known as the Father of the Boundary Layer, in 1904. He explained that a boundary layer is formed when a thin layer of fluid is created when fluids flow over a stationary surface. This new theory has opened the window for researchers to study various physical situations of boundary layer has in order to meet different industrial applications and technological processes. When a fluid starts to flow over a surface or sheet, the friction between the fluid layers near to the boundary layer has slowly created the boundary.