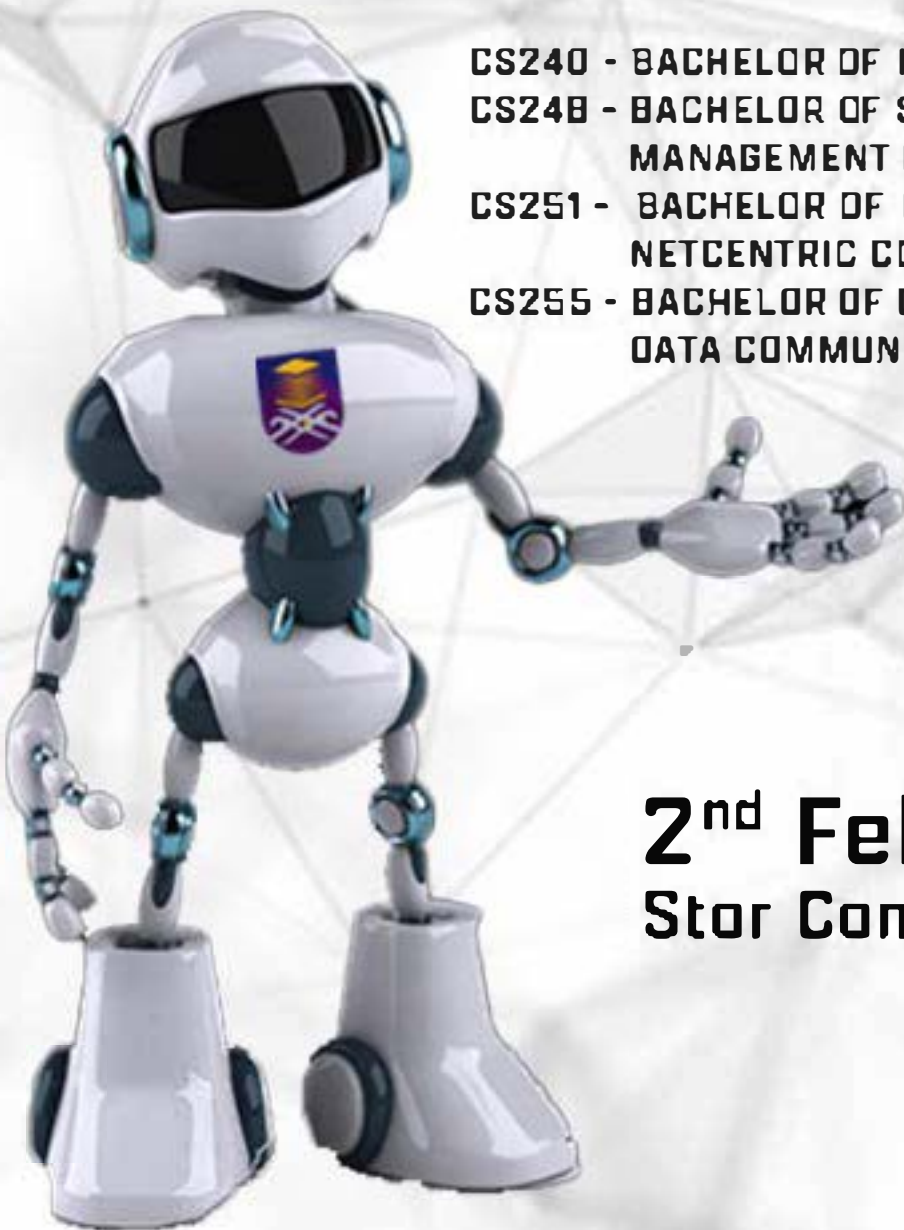

RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES

REMACS 5.0



CS240 - BACHELOR OF INFORMATION TECHNOLOGY [HONS.]
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2nd February 2023
Stor Complex, UiTM Perlis

Organized by:
College of Computing, Informatics and Media
Universiti Teknologi MARA Perlis Branch

**Research Exhibition in Mathematics and Computer Sciences
(REMACS 5.0)**

Research Exhibition in Mathematics and Computer Sciences (REMACS 5.0)

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Preface

It is with great pleasure that we present this extended abstract book, titled "The 5th Research Exhibition in Mathematics and Computer Sciences (REMACS 5.0)". This book is a collection of research work in the fields of Computer Science and Mathematics, contributed by the final year students from Universiti Teknologi MARA, Perlis Branch. The aim of this book is to showcase the diversity and depth of research in these two interrelated fields.

Mathematics and Computer Science are two fields that have seen tremendous growth and advancement in recent years. With the rise of new technologies and the increasing demand for data-driven solutions, researchers in these fields have been working hard to develop new theories, algorithms, and models that can help solve some of the most pressing problems of our time. This book is a testament to their hard work and dedication.

The abstracts in this book cover a wide range of topics, including algebra, analysis, logic, computer architecture, algorithms, artificial intelligence, machine learning, computer network, netcentric computing and many more. The work presented here is both theoretical and practical, and has the potential to impact many areas of society, from finance and healthcare to education and security.

We hope that this book will serve as a valuable resource for future students in the fields of Mathematics and Computer Science. We also hope that it will inspire more students to pursue innovative and groundbreaking research in these two fields. Finally, we would like to express our gratitude to all the contributors for their hard work and dedication, without which this book would not have been possible.



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REMACS 5.0

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EVENT SCHEDULE

8:00 – 8:30 am

- Registration

8:00 am – 12:00 pm

- FYP Project Presentation

12:00 - 2:00pm

- Lunch Break

2:15 – 2:35 pm

- National & Wawasan Setia Anthems
- Doa Recitation

2:35 – 2:45 pm

- Welcoming Address by Director of REMACS 5.0

2:45 – 2:55 pm

- Officiating & Closing Remarks from Rector of UiTM Perlis

2:55 – 3:00 pm

- REMACS 5.0 Montage

3:00 – 4:00 pm

- Awarding of Winners:
 - Best Poster
 - Best Project Award

- Photo Session

- End of Ceremony

Dress Code: Formal / Corporate

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EXTENDED ABSTRACTS

RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES
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HEAT SOURCE AND CONSTANT WALL TEMPERATURE OF MHD FERROFLUIDS ON EXPONENTIALLY STRETCHING AND SHRINKING SURFACE UNDER STAGNATION POINT REGION

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Abstract

The problem of magnetohydrodynamic flow and heat transfer ferrofluids with a heat source and constant wall temperature is presented in the study. Under the stagnation point region, the surface is assumed to stretch or shrink exponentially and the wall temperature also is assumed to be constant. By using the similarity transformation, the governing partial differential equations are transformed into nonlinear ordinary differential equations (ODE). For some values of parameters, the equations are then numerically solved using the Range-Kutta Fehlberg (RKF) method in Maple Software. For this study, two types of ferroparticles, magnetite and cobalt ferrite with water as a base, are considered. The numerical solutions for the skin friction coefficient, heat transfer rate, velocity and temperature profile as influenced by the magnetic parameter, stretching and shrinking parameters, and heat source parameter are graphically displayed and discussed in depth. In the shrinking case, cobalt ferrite appears to have a higher skin friction coefficient and heat transfer rate than magnetite. Meanwhile, in the stretching case, cobalt ferrite has a higher skin friction coefficient, but magnetite has a higher heat transfer rate. Magnetite has a higher skin friction coefficient and heat transfer rate than cobalt ferrite for magnetic parameters. Magnetite also appears to have a higher heat transfer rate in the presence of heat source than cobalt ferrite.

Keywords: MHD ferrofluid, heat transfer rate, skin friction coefficient, stretching/shrinking surface, heat source.

1. Introduction

The main objective of this study is to investigate the heat transfer of MHD ferrofluid on exponentially stretching/shrinking surface under stagnation point region with the presence of heat source/sink. This research also aims to build a mathematical model of MHD ferrofluid on an exponentially stretching/shrinking surface with a heat source and constant wall temperature, as well as to solve the velocity and temperature of MHD ferrofluid using similarity transformation. This study is limited to a problem involving a surface that is assumed to stretch or shrink under the stagnation point region, accompanied by ferrofluid flow with MHD also heat source effects. The equation for each problem are transformed into ordinary differential equations by using similarity transformation. Then, by using Range-Kutta Fehlberg (RKF), the resulting similarity equations are then solved numerically.

2. Methodology

The continuity, momentum, energy and concentration equation are derived based on the boundary layer theory. Then, the governing partial differential equations are transformed into ordinary differential equations by using similarity transformation. The ordinary differential equations are then solved by using the Range-Kutta Fehlberg method. Using the Maple software, the numerical techniques used in this study were developed.

3. Results and Discussion

Tables and graphs are used to present the skin friction coefficient and heat transfer rate, along with the velocity and temperature profile for a various range of parameter such as stretching/shrinking parameter, magnetic parameter and also heat source/sink parameter, and volume fraction of solid ferroparticle. As a result, values of skin friction coefficient and heat transfer rate are decreasing when stretching/shrinking parameter values increases. For shrinking case, cobalt Ferrite have higher value of skin friction coefficient and heat transfer rate compare to magnetite. Next, for magnetic parameter, we can conclude that both skin friction and heat transfer rate are decreasing when magnetic parameter increase and magnetite have the highest number of skin friction coefficient and heat transfer rate. With the presence of heat source, the number of heat transfer rate increase when heat source parameter increase, but values of skin friction coefficient seem to remain constant since heat source parameter do not give any impact.

4. Novelty of Research / Product

There have been a number of research that have investigate the heat transfer rate and skin friction coefficient for ferrofluid with water as a base with the influenced of various parameter such as stretching/shrinking surface, magnetic parameter, wall mass transfer parameter and volume fraction of solid ferroparticle (Rasli et al.,2021). Thus, this study continuous the work by including the effect of heat source as well as constant wall temperature and wall mass transfer parameter that are studied before are being removed.

5. Conclusion

The analysis yields a brief summary in which cobalt ferrite has a higher value of skin friction coefficient and heat transfer rate compared to magnetite for stretching/shrinking parameter. Next, magnetite has the highest number of skin friction coefficient and heat transfer rate when magnetic parameter are changing. With a presence of heat source, Magnetite also appears to have a higher heat transfer rate than cobalt ferrite.

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Rasli, N., & Ramli, N. (2021). Magnetohydrodynamic flow and heat transfer over an exponentially stretching/shrinking sheet in ferrofluids. *Pertanika Journal of Science and Technology*, 29(3), 1811–1829. <https://doi.org/10.47836/pjst.29.3.42>

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