
RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES

REMACS 5.0



CS240 - BACHELOR OF INFORMATION TECHNOLOGY [HONS.]
CS248 - BACHELOR OF SCIENCES [HONS.]
MANAGEMENT IN MATHEMATICS
CS251 - BACHELOR OF COMPUTER SCIENCE [HONS]
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DATA COMMUNICATION & NETWORKING

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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.



RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES
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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STAGNATION POINT FLOW OF NANOFLUIDS OVER STRETCHING/SHRINKING SURFACE WITH HEAT SOURCE/SINK AND CONSTANT WALL TEMPERATURE

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Abstract

This study presents a problem of nanofluid stagnation point flow over a stretching/shrinking sheet with impacts from heat source/sink and constant wall temperature. By using appropriate similarity transformations, the governing partial differential equations are converted into nonlinear ordinary differential equations. The Runge-Kutta-Fehlberg (RKF) and shooting methods are then used to numerically solve these equations for the relevant parameters. In this study, three different types of nanoparticle copper Cu , alumina Al_2O_3 , and titania TiO_2 are used in a water-based nanofluid. The numerical solutions for the skin friction coefficient $C_f Re_x^{1/2}$, heat transfer rate $Nu_x Re_x^{1/2}$, velocity profiles $f'(\eta)$, and temperature profiles $\theta(\eta)$ affected by the stretching/shrinking parameter λ , the heat source/sink parameter β , and the nanoparticle volume fraction ϕ are graphically represented and further discussed.

Keywords: Runge-Kutta-Fehlberg (RKF), shooting, nanoparticle, skin friction coefficient, heat transfer rate

1. Introduction

The study of heat and mass transport is gaining popularity among researchers due to its relevance in everyday life. It is significant in the engineering, medicinal, and other fields. Many researchers have conducted research on boundary layer flow over a shrinking sheet. It is because this flow generates turbulence and then the flow is not free to move over a boundary surface consequently, the problem appears that there we need to have an external force which helps to flow easily. When the external force is limited, the influence of suction is appropriate. The primary of this study is to investigate the stagnation point flow of nanofluids over stretching/shrinking surface with heat source/sink and constant wall temperature. The scope of study is limited to looks into steady, two-dimensional incompressible laminar boundary layer flows over stretching or shrinking sheets with heat source/sink in nanofluid. The governing equations for each problem investigated are changed to ordinary differential equations using the similarity transformation. The resultant similarity equations are then numerically solved using the shooting method.

2. Methodology

The similarity transformation is used to convert the nonlinear partial differential equations into a system of nonlinear ordinary differential equations. To solve the reduced nonlinear ordinary differential equations, the shooting method, RKF, and Newton Raphson correction are used. The numerical methods employed in this study were created using Maple software.

3. Results and Discussion

The numerical results are presented in tables and graphs for the skin friction coefficient and heat transfer rate number as well as the velocity and temperature profile for a range of various parameters such as

nanoparticles volume fraction, stretching/shrinking parameter and heat source/sink parameter. As a result, skin friction coefficient decreases with heat transfer rate decrease for all combinations of nanofluids when stretching/shrinking parameters increase. The skin friction coefficient of CuH_2O is higher than $\text{Al}_2\text{O}_3\text{H}_2\text{O}$ and $\text{TiO}_2\text{H}_2\text{O}$ when varying stretching/shrinking parameters. Next, the skin friction coefficient does not change while heat transfer rate decreases for all combinations of nanofluids when heat source/sink parameter increases. Furthermore, heat transfer rate of CuH_2O is higher than $\text{Al}_2\text{O}_3\text{H}_2\text{O}$ and $\text{TiO}_2\text{H}_2\text{O}$ when the heat source/sink parameter varies. The outcomes show that the heat transfer rate of CuH_2O is higher than other nanofluids because the thermophysical properties of Cu solid particles are the highest among the others. Last but not least, the results indicate that the solid volume fraction affects the fluid flow and heat transfer characteristics.

4. Novelty of Research / Product

To the best of the authors' knowledge, only one previous study used HAM to solve similar equations and boundary conditions, emphasising the novelty of the current work. Furthermore, no radiation effects were considered in the previously stated paper. This mathematical method is briefly described, along with its specific application to the issue being studied. Additionally, no nanoparticles $\text{TiO}_2\text{H}_2\text{O}$ in Ibrahim et al. (2013). Therefore, this study continues the work by including the effect of heat source/sink and stretching/shrinking parameter of boundary condition on the steady two-dimensional laminar boundary layer flow.

5. Conclusion

Stagnation point flow of nanofluids over stretching/shrinking sheet with heat source/sink impacts, as well as constant wall temperature had been numerically assessed. The numerical results are presented in tables and graphs for the skin friction coefficient and heat transfer rate number as well as the velocity and temperature profile for a range of various parameters such as nanoparticles volume fraction, stretching/shrinking parameter and heat source/sink parameter.

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