RESEARCH

Emirates Aviation University
Research Newsletter

Message from the Vice-Chancellor

by Professor Ahmad Al Ali

I am pleased to introduce you to the inaugural edition of the Emirates Aviation University monthly research newsletter. The newsletter will feature research activities across the University.

The purpose of the research newsletter is to share our research activities and output with other academics and industry and ensure wider dissemination of research findings within and beyond the university.

The university continues to recognise the importance of cutting-edge research in improving students learning experience and advancing

IN THIS ISSUE

In our continued efforts to support research activities, growth, and strategic expansion within the University, we recently recruited a Director of Research to lead the university Research Office and steer university efforts in raising our research profile nationally and internationally across all discipline areas.

I am pleased to welcome and introduce Professor Zindoga Mukandavire our Director of Research. He is a Professor of Applied Mathematics with research interests in applied mathematics, modelling infectious diseases, data science, artificial intelligence, and optimisation.

The role of the Research Office includes, supporting and promoting existing and new research initiatives, promoting university engagement in new research opportunities, and developing multidisciplinary collaborations. The setting up of the Research Office and recruitment of the Director of Research is an important step by the university as it prepares to launch a Centre in Data Science and Artificial Intelligence and plans to set up PhD programmes in areas of Applied Mathematics, Data Science and Business Management. In the near future the university will recruit full-time research faculty to support the Centre for Data Science and Artificial Intelligence and other research activities within the university.

Finally, I would like to continue to encourage all faculty to engage in research activities and work with the Research Office in creating a conducive research environment and advancing our academic mission.

Message from the Director of Research

by *Professor Zindoga Mukandavire*

I am excited about the opportunity to work with all faculty members to advance the mission and vision of the university in my new position as the Director of Research. As part of my duties, I am responsible for coordinating the implementation of the University Research Strategy by supporting the establishment and development of research and scholarly activities directed towards the creation, integration, and application of knowledge in accordance with university goals. In the drive to scale up research and scholarly activities, part of my objectives are to enhance research quality, relevance, impact, and intellectual contribution. I will also set up structures that provide training and support to research faculty, facilitates and nurture academic and industrial collaborations and partnerships.

In this edition of the research newsletter, we highlight our first seminar presentations given by faculty members from the Business School, School of Engineering and School of Mathematics, Statistics and Computing. The seminar presentations were very encouraging and motivating as they showcased research activities and expertise in each school, and this is very crucial in promoting multidisciplinary research collaboration within the university.

I would like to thank colleagues who volunteered to share their research in the seminar series. The Research Office will continue to organise similar seminars and we will be inviting external speakers to present for future seminars. This issue also includes a list of recent publications by faculty members.

I would like to encourage all faculty to contribute to the newsletter and to send us comments and suggestions on how we should improve future newsletter editions. I am looking forward to working with you all in developing a vibrant research environment and advancement of our academic mission.

Seminars

The Research Office organised two seminar series in the month of April with speakers from the Business School, School of Engineering and School of Mathematics, Statistics and Computing. The titles and abstracts of the research talks are given below. Readers interested in the presentation slides and video recordings can contact the Research Office.

Seminar # 1 - 7th April 2021
Re-imagining the Educational Experience: Generation Z's Perspectives on Higher Education

by Dr Ahlam Al Zoubi
EAU Business School

This study explored the associations that Generation Z students have related to a global business school. Using an innovative projective technique (Koenigstorger, Groeppel-Klien, & Pla 2008), the researchers drew out and identified subconscious themes that students most associated with a particular business school. An analysis of the findings indicated that achievement, friendship, global scope, and future vision were the most important characteristics that emerged. These results suggest that to attract and retain Generation Z students and ensure student satisfaction, business schools need to enhance and promote these aspects of the educational experience creating a more holistic and polyphonic learning environment. Faced with the prospect of a fundamental change to the higher education environment due to the COVID 19 pandemic, the challenge of how to satisfy the expectations of Generation Z learners while maintaining a safe physical space is even more crucial.

Seminar # 2 - 7th April 2021
Identification of a New Rheology Dependent Platelet Aggregation Mechanism Driving Thrombus Growth

by Dr Elham Taloei
School of Engineering

Platelet aggregation at sites of vascular injury is essential for hemostasis and arterial thrombosis. It has long been assumed that platelet aggregation and thrombus growth is initiated by soluble agonists generated at sites of vascular injury. By utilizing high resolution intravital imaging techniques and hydrodynamic analyses we demonstrate that platelet aggregation is primarily driven by changes in blood rheology, with soluble agonists playing a secondary role, stabilizing formed aggregates. In response to vascular injury, thrombi initially develop through the progressive stabilization of discoid platelet aggregates. Analysis of blood flow dynamics revealed that discoid platelets preferentially adhere in low shear zones on the downstream face of forming thrombi, with stabilization of aggregates dependent on the formation of a novel membrane adhesion structure. These findings provide new insight into the prothrombotic effects of disturbed rheology and suggest a fundamental reinterpretation of the mechanisms driving platelet aggregation and thrombus growth.

Seminar # 3 - 14th April 2021
One-way coupled fluid–structure interaction of gas–liquid slug flow in a horizontal pipe: Experiments and simulations

by Dr Abdalellah Mohmmed
School of Engineering

Pipelines conveying a multiphase mixture must withstand the cyclic induced stresses that occur due to the alternating motion of gas pockets and liquid slugs. Few previous studies have considered gas–liquid slug flow and the associated fluid–structure interaction problems. In this study, experimental and numerical techniques were adopted to simulate and analyze the two-phase slug flow and the associated stresses in the pipe structure. In the numerical simulation, a one-way coupled fluid–structure framework was developed to explore the slug flow interaction with a horizontal pipe assembly under various superficial gas and liquid velocities. A modified Volume of Fluid and finite element methods were utilized to model the fluid and structure domains. The file-based coupling technique was adopted to execute the coupling mechanism. By contrast, slug characteristics were measured experimentally, while Bi-axial strain gauges were used to capture time-varying strain signals. Excellent agreements between the predicted and measured stress results were achieved with a maximum error of 10.2 %. It was found that at constant superficial liquid velocity, the maximum induced stresses on the pipe wall increased with increasing the slug length and slug velocity. While for the slug frequency, the maximum principal stresses decreased with increasing the slug frequency.

Seminar # 4 - *14th April 2021*

Some Classes of Operators Related To p-Hyponormal Operator

by Dr Reyaz Ahmed

School of Mathematics, Statistics and Computing

We introduced a new family of classes of operators termed as *p-paranormal operator,*A(p,p); p >0 and *A(p.q); p,q>0, parallel to p-pranormal operator and classes A(p,p);p>0 and A(p,q);p,q>0 introduced by M.Fuji,D. jung.S.H.Leeand R. Nakamoto[1].We present a necessary and sufficient condition for p-hyponormal operator T_ϵ B(H) to be *p-paaranormal and the monotonocity of *A(p,q). We also present an alternative proof of a result of M.Fuji,et.al.[,Theorem 3,4]

PUBLICATIONS

1.Hicham Machmouchi and Ravishankar Pillai, Comparison of the performance of refrigeration systems with and without nanoparticles, In: Sustainable Development and Planning XI (eds. Syngellakis and S. Hernández), WIT Transactions on Ecology and the Environment, Volume 241, 283 – 294, 2020, https://www.witpress.com/Secure/elibrary/papers/SDP20/SDP20023FU1.pdf

2.Abdalellah O. Mohmmed, Hussain H. Al-Kayiem, A.B. Osman, Investigations on the slug two-phase flow in horizontal pipes: Past, presents, and future directives, Chemical Engineering Science, Volume 238,2021,116611, ISSN 0009-2509, https://doi.org/10.1016/j.ces.2021.116611

3.Esteban Correa-Agudelo, Hae-Young Kim, Godfrey N. Musuka, Zindoga Mukandavire, Adam Akullian, Diego F. Cuadros, Associated health and social determinants of mobile populations across HIV epidemic gradients in Southern Africa, Journal of Migration and Health, Volume 3,2021,100038,ISSN 2666-6235, https://doi.org/10.1016/j.jmh.2021.100038.

4.Wasim Ahmad Malik, Towards Innovation and Diversity, A sequel of 'The 'HOW' of a Peaceful and Tolerant World', Lambert Academic Publishing, Germany. ISBN 978-620-3-30404-6 Pages 124, 2021.