THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

COLLEGE OF PROFESSIONAL AND CONTINUING EDUCATION
專業及持續教育學院

School of Professional Education and Executive Development
專業進修學院

SPEED

Research Centre for Advanced Design, Materials and Manufacturing Technologies (RCADMM) Research Seminar

DATE: 25 September 2020 (Friday)
TIME: 12:30 pm – 2:00 pm
VENUE: ONLINE (Zoom)

The seminar is fully supported by a grant from the Research Grants Council of the HKSAR, China. (Project No.: UGC/IDS(R)24/19)

Registration!

Click Here

Ir Prof Pak Kin Wong

Professor and Associate Dean (Academic Affairs)
Department of Electromechanical Engineering
Faculty of Science and Technology
University of Macau

Topic

Adaptive Control of Vehicle Yaw Stability by using Active Front Steering System and Extreme Learning Machine

Abstract

Active front steering can enhance the vehicle yaw stability, which is essential to road safety. However, the intelligent control of vehicle yaw rate is very challenging due to 1) the unmodeled nonlinearity and uncertainties in vehicle dynamics; 2) timely response in control scheme. These two issues can be simultaneously alleviated through an emerging machine learning approach, extreme learning machine (ELM), for its high model generalization and fast computational speed. However, typical ELM cannot be directly applied to adaptive control applications. For this reason, a new ELM-based adaptive control method is proposed, which is equipped with a newly designed adaptation law based on the theorem of Lyapunov stability. To test the performance of the proposed control method, simulations were carried out. Simulation results show that, compared to conventional backpropagation neural network based controller, the proposed ELM-based adaptive controller can reduce the response time and oscillatory steering in the case of cornering maneuver under fast variant vehicle speed. The results also demonstrate that the proposed ELM-based adaptive controller outperforms the latest fuzzy logic controller and error feedback control in terms of tracking errors of desired vehicle yaw rate, sideslip angle and intended path. Overall, the proposed ELM-based adaptive controller is promising to vehicle yaw stability control. Finally, this seminar will also introduce other engineering applications of adaptive ELM.

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

COLLEGE OF PROFESSIONAL AND CONTINUING EDUCATION
專業及持續教育學院

School of Professional Education and Executive Development
專業進修學院

SPEED

Dr CHEN, Yi Cindy

Lecturer, School of Professional Education and Executive Development, PolyU

Topic: Indirect evaporative cooler design for efficient energy recovery in air-conditioning systems

Abstract

Indirect evaporative cooler (IEC) which uses water evaporation to produce cooling air without adding extra moisture has become increasingly attractive as a natural cooling technology. However, in hot and humid regions, the IEC application is restricted to the high humidity. In recent decant, the hybrid IEC and mechanical cooling has been proposed to break the regional limitation of IEC application and attracts great research interest for its high energy saving potential. In this hybrid system, IEC is used as an energy recovery device installed before an AHU in an air-conditioning system. When IEC applied in humid regions, condensation would occur on the fresh air side. The unique heat and mass transfer process involved with both sensible and latent heat transfer is much more complicated compared with that of dry region cases. Therefore, a systematic research work was carried out to investigate the performance of IEC energy recovery system and optimize the IEC structure by numerical simulation, experimental study and field measurement.

Dr LEUNG, Wing-yan Maggie

Lecturer, School of Professional Education and Executive Development, PolyU

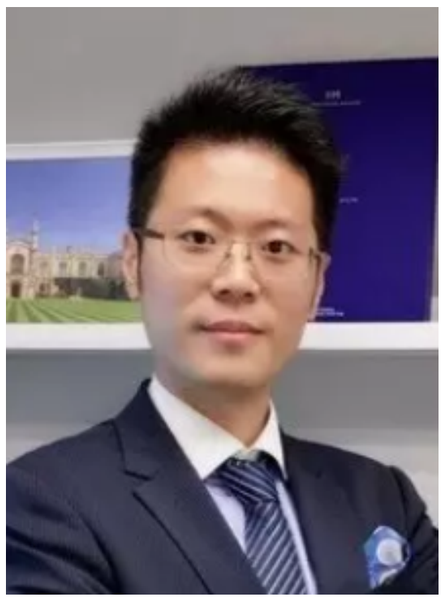
Topic: Strength Enhancement of Stainless Steel 304 through Surface Mechanical Attribution Treatment (SMAT)

Abstract

Nanotechnology has become very important in material processing. Some common manufacturing methods, e.g. electrodeposition, powder technology and carbon nanotubes, can prepare nanocrstaline materials. However, they are mostly applicable for non-metal and the chemical composition of metal may be changed afterwards. A mechanical hardening method, Surface Mechanical Attribution (SMAT), is a way to produce the nanostructure of metal by refining the grain size without changing the chemical composition. Numerous balls are placed in a closed chamber and hit to the target specimen randomly due to energy provided by the vibration horn. Several factors will affect the result of SMAT. In the past years, a series of experiments were conducted to investigate the effect of different factors and the mechanical strength of the specimen after SMAT. In practical, it is hard to choose the combinations of different factors to achieve the target mechanical strength. As the first stage of research, a computational model was developed to model the SMAT process. Through this model, the relationship between the number of ball impacts, processing duration and the number of balls were firstly investigated as the foundation of the prediction of the mechanical strength after SMAT.

Dr WU, Yang Andrew

Lecturer, School of Professional Education and Executive Development, PolyU



Topic: Incentive policy mechanism and financial subsidies for EV industry in China

Abstract

This presentation reviews the national policy measures and financial incentives for the sustainable development of electric vehicle (EV) industry in a macro scope in the past decade. Recently released dual-credits policy regime is then examined with a mathematical model to quantify the impact on EV industry. Simulation results are provided and explained. In conclusion, strategic implications for EV market participants are discussed for sustainable development in the future. This presentation also shares experience of an IIDS project related with EV research.

All are welcome!

Please click here or scan the QR code for registration

For enquiry, please contact Ms. Jenny Li at jenny.li@speed-polyu.edu.hk on or before 24 September 2020.