

CONFERENCE ABSTRACTS

ICMAA 2020

The 4th International Conference on Mechanical,
Aeronautical and Automotive Engineering

ICAMD2020

The 3rd International Conference on Automation, Mechanical and
Design Engineering

AAME2020

The 3rd International Conference on Aeronautical, Aerospace and
Mechanical Engineering

ICMDE2020

The 6th International Conference on Mechanical Design and
Engineering

Bangkok, Thailand | February 26-29, 2020

www.icmaa.org | www.icamd.org | www.icaam.org | www.icmde.org

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AGENDA AT A GLANCE

< February 26, 2020, Wednesday >

 Lobby, 1F	
10:00-17:00	Onsite Registration & Conference Materials Collection

< February 27, 2020, Thursday >

 Chong Nonsi Meeting room, 12F	
9:00-9:05	Opening Remark
9:05-9:50	Keynote Speech I Prof. KHOO Boo Cheong National University of Singapore, Singapore
9:50-10:20	 Coffee Break & Group Photo 
10:20-11:10	Keynote Speech II Prof. Jia-Yush Yen National Taiwan University, Taiwan
11:10-11:40	Invited Speech Prof. Assim H. Yousif Al-Daraje Philadelphia University, Jordan
 The Glass House, 5F	
12:00-13:30	Join Buffet Lunch - @Restaurant

📍 Chong Nonsi Meeting room, 12F		📍 Sala Daeng Meeting room, 12F	
13:30-15:00	Oral Session I - “Power Machinery and Applied Mechanics”	13:30-15:00	Oral Session II - “Electronics and Control Engineering”
15:00-15:30	 Coffee Break		
15:30-17:00	Oral Session III - “Materials and Mechanical Engineering”	15:30-17:00	 Poster Session
📍 Function room, 33F			
18:00-20:00	Gala Dinner		

< February 28-29, 2020, Friday-Saturday >

9:00-16:00	Free Arrangements (It is advisable to cancel other activities because of 2019-nCoV. The participants are recommended to arrange freely. Thanks for your kindly understanding.)
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Welcome Address

Dear professors and distinguished delegates,

It gives us immense pleasure to invite you to The 4th International Conference on Mechanical, Aeronautical and Automotive Engineering (ICMAA 2020); The 3rd International Conference on Automation, Mechanical and Design Engineering (ICAMD 2020); The 3rd International Conference on Aeronautical, Aerospace and Mechanical Engineering (AAME 2020) and The 6th International Conference on Mechanical Design and Engineering (ICMDE 2020) during the period February 26-29, 2020 at Bangkok, Thailand.

The conference brings together researchers looking for opportunities for conversations that cross the traditional discipline boundaries and allows them to resolve multidisciplinary challenging problems that only a venue of this nature can offer. It is the clear intent of the conference to offer excellent mentoring opportunities to participants. Through this amazing event we trust that you will be able to share the state-of-the-art developments and the cutting-edge technologies in these broad areas.

Special thanks are extended to our colleagues in program committee for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee and the volunteers who had dedicated their time and efforts in planning, promoting, organizing and helping the conference. Last but not least, our special thanks go to invited keynote speakers as well as all the authors for contributing their latest researches to the conference.

This conference program is highlighted by two keynote speakers and one invited speaker: Prof. KHOO Boo Cheong, National University of Singapore, Singapore; Prof. Jia-Yush Yen, National Taiwan University, Taiwan; Prof. Assim H. Yousif Al-Daraje, Philadelphia University, Jordan.

We hope this success can develop into persistent success annually, in which there are presenters from all corners of the globe and all major countries.

We wish you a successful conference and enjoyable visit in Bangkok, Thailand!

Conference Committee
Bangkok, Thailand

Organizing Committee

Advisory Chair

KHOO Boo Cheong, National University of Singapore, Singapore

Conference Chairs

Ratchatin Chanchareon, Chulalongkorn University, Thailand

Jia-Yush Yen, National Taiwan University, Taiwan

Program Chairs

Xiaomin Wu, Tsinghua University, China

Marcelo H. ANG Jr, National University of Singapore

Steering Chair

Haider F. Abdul Amir, University Teknologi Mara in Shah Alam, Malaysia

Regional Chair

Ricardo Nuno Madeira Soares Branco, University of Coimbra, Portugal

Publicity Chair

Sivakumar A/L Dhar Malingam, Universiti Teknikal Malaysia Melaka, Malaysia

International Technical Program Committee

B.Vijaya Ramnath, Sri Sairam Engineering College, India

Marco Gadola, University of Brescia, Italy

Sivakumar A/L Dhar Malingam, Universiti Teknikal Malaysia Melaka, Malaysia

Prabhudev M.S, Government Polytechnic, Kalgı, India

GUELAILIA Ahmed, Algerian Space Agency, Satellite Development Center, Space Mechanical Research Department, Algeria

Valentin Abadjiev, Bulgarian Academy of Sciences, Sofia, Bulgaria

Emilia Abadjieva, Akita University, Japan

David Pritchard, State University of New York Empire State College, USA

Muhammad Jahan, Miami University, USA

Wang Qi, Nanchang Hangkong University, China

Meng-Qiang Wu, University of Electronic Science and Technology of China, China

Privalov Alexander Nikolaevich, Tula State University, Russia

S. Mekid, King Fahd University of Petroleum and Minerals, Saudi Arabia

Ricardo Nuno Madeira Soares Branco, University of Coimbra, Portugal

Mohamed RAHOU, ESSA Tlemcen, Algeria

Srikiran Satuluri, Lendi Institute of Engg. And Technology, India
N. Ethiraj, Dr. M.G.R. Educational and Research Institute, India
Niranjan C. Bhat, WIDU, India
Mohammad Khan, Abu Dhabi University, United Arab Emirates
Sachin Borse, Shaqra University, Kingdom of Saudi Arabia
Mohamed TEGGAR, Université Amar TELIDJI de Laghouat, Algérie
Loh Ser Lee, Universiti Teknikal Malaysia Melaka, Malaysia
Cheng See Yuan, Universiti Teknikal Malaysia Melaka
Mohd Nizam Bin Sudin, Universiti Teknikal Malaysia Melaka, Malaysia
Thatchapol Chungcharoen, King Mongkut's Institute of Technology Ladkrabang, Thailand
Grzegorz Ilewicz, University of Bielsko-Biała, Poland
Dipen Kumar Rajak, Sandip Institute of Technology & Research Centre (SITRC) Sandip
University, India
Wahyu Nirbito, Universitas Indonesia, Indonesia
Prokash C. Roy, Jadavpur University, India

Conference Venue



Eastin Grand Hotel Sathorn Bangkok

Address: 33/1 South Sathorn Road, Yannawa, Sathorn, Bangkok, Thailand

Email: rsvn@eastingrandsathorn.com

Tel: +662 210 8100

Web: <https://www.eastinhotelsresidences.com/eastingrandsathornbangkok/>

Room reservation link: <https://bit.ly/2kW81uf>



Weather

Bangkok Forecast Temperatures during Feb. 26-29

Average daily minimum temperature

27°C

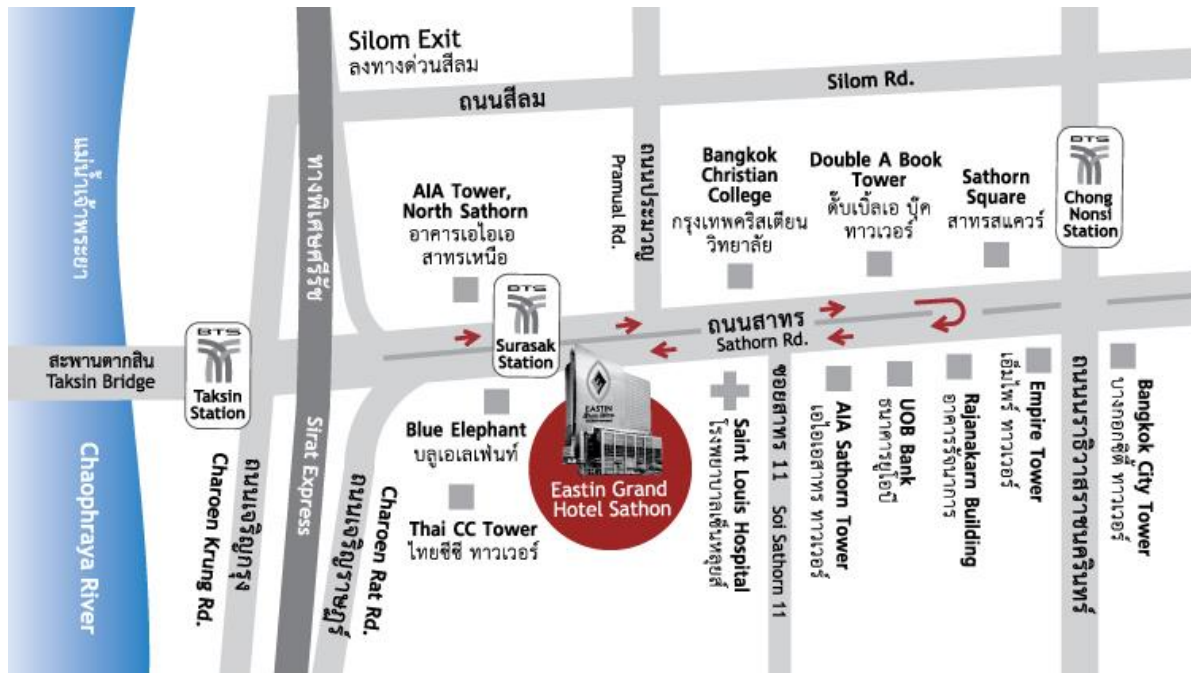
Average daily highest temperature

36°C



Access to the hotel

pproximately 45 minutes by car from both Airports



> From Suvarnabhumi Airport – Enter the expressway in Dao Kanong direction. Take Sathorn exit, go straight on and turn right on to Sathorn Road and keep right, make a u-turn before traffic lights and keep left. The hotel is located on the left hand side of the road.

> From Don Muang Airport - Enter the toll way then expressway in Dao Kanoang – Rama9 direction. Take Dao Kanong direction use Silom exit, go straight on and turn left on to Sathorn Road and keep right, make a u-turn before traffic lights and keep left. The hotel is located on the left hand side of the road.



Emergency Calls

Fire: 199

Police: 191

Ambulance: 1691

Key Points



Oral Presentation

- ◆ Timing: a maximum of 15 minutes in total, including 3 minutes for Q&A. Please make sure your presentation is well timed.
- ◆ All oral session rooms are equipped with data projectors with a standard VGA connector. The speakers could also bring and use their own laptops or other presentation devices. Please check the compatibility of your laptop and the project before the session starts.
- ◆ It is suggested that you email a copy of your presentation to your personal inbox as a backup in case for some reason the files can't be accessed from your flash drive.
- ◆ Videos: If your Power Point files contain videos please make sure that they are well formatted and connected to the main files.
- ◆ Please stay at the room until the session is finished. The certificate would be given by the session chair, one best presentation will be selected from each session, and the best one will be announced and awarded at the end of each session. Session group photo will be taken after the award.



Poster Presentation

- ◆ Poster size is 60cm x 80cm.
- ◆ The posters must be written in English.
- ◆ Posters are required to be condensed and attractive.



Dress Code

- ◆ Please wear formal clothes or national characteristics of clothing.

(!) IMPORTANT NOTES

- ❖ ALWAYS take care of your belongings during the conference.
- ❖ ALWAYS wear your participation badge during the conference. There will be NO access for people without a badge.
- ❖ NEVER discard your badge at will. There's a risk of irrelative people who use it for unknown purpose.
- ❖ Accommodation is not provided, and it's suggested make an early reservation

Disclaimer: The conference organizer does not assume any responsibility for the loss of personal belongings of the participants.

Speakers Overview

Keynote Speech I



Prof. KHOO Boo Cheong

National University of Singapore, Singapore

Presentation:

“Flow over shallow dimple arrays”

Abstract:

Dimple arrays have been successfully used for heat transfer enhancement because they increase the heat transfer at a relatively smaller penalty in terms of pressure losses compared to traditional heat transfer devices just as fins and pins (Moon et al. 2000, Chen et al. 2012). These usually involve relatively deep dimples with dimple depth to diameter ratios of more than 10% to generate the increased flow mixing for heat transfer enhancement. Some studies have also shown that arrays of dimples can also be used for drag reduction, and these typically involve very shallow round-edged dimples with depth to diameter ratios of 5% or less (Lienhart et al. 2008, Tay et al. 2015, van Nesselrooij et al. 2016). Maximum drag reduction obtained with such passive dimples are relatively small, with maximum drag reductions of about 5% for circular axisymmetric dimples.

Flow visualization experiments as well as numerical simulations have revealed the presence of streamwise vortices within the dimple as well as regions of flow separation at the upstream portion of such dimples (Ligrani et al. 2001, Isaev et al. 2002, Tay et al. 2014). The flow structure within the dimples as well as the size of the flow separation region was found to vary with the Reynolds number of the flow. This, together with the many parameters such as dimple depth to diameter ratio and the relative curvature at the dimple edge and within the dimple that affect the flow make the flow over the dimples relatively complicated to study (Mahmood and Ligrani 2002, Won et al. 2005, Tay et al. 2017). Nevertheless, having a better understanding of the flow mechanism causing the drag reduction would enable us to optimize the shape of the dimple and maximum the drag reduction obtained using such passive dimples. This is the main motivation of the present work on dimples.

Both experiments and numerical simulations have been carried out on shallow round-edged dimple arrays with dimple depth to diameter ratios of 5%. Pressure measurements have been carried out to quantify the drag reduction due to the dimple array in a turbulent channel flow for Reynolds numbers between 5,000 and 37,000, and hot-wire anemometry and Detached Eddy Simulations (DES) have been carried out to understand the flow over the dimples in greater detail. The study shows that the drag due to the dimple array reduces as the Reynolds number increases from 5,000 to 37,000. A drag increase is observed at Reynolds numbers below 13,000, while a drag reduction is observed above this Reynolds number. Similar streamwise vortices are observed with such shallow dimples as

those observed in deeper dimples with depth to diameter ratios of 10% (Ligrani et al. 2001, Won et al. 2005). These streamwise vortices generate spanwise flow components near the dimple surface, resulting in reduced skin friction similar to those observed with traverse wall or flow motions (Iuso et al. 2002, Karniadakis et al. 2003). The flow is stabilized when drag reduction is present and shifts in the power spectra of the streamwise velocity signal as well as reductions of the peaks in the terms of the turbulence energy budget is observed with the drag reduction.

Although streamwise vortices are also present at lower Reynolds numbers, a drag increase is observed at lower Reynolds numbers, together with a relatively large flow separation region. The large flow separation region results in a large form drag at low Reynolds numbers. As the Reynolds number increases, the flow separation region shrinks, resulting in reduced form drag at higher Reynolds numbers.

The results show that while the streamwise vortices generating spanwise flow near the surface can reduce the skin friction drag, form drag present within the three-dimensional dimples can be significant enough that an increase is observed in the total drag. To optimize the dimple shape and maximize drag reduction, both the skin friction and form drag should be reduced. One possible method to reduce this form drag is through the use of asymmetric dimples, where the deepest point within the dimple is shifted backward, resulting in a shallower wall gradient at the upstream portion of the dimple. This has been shown to reduce the flow separation at the upstream portion of the dimples for deeper dimples with depth to diameter of 10% (Chen et al. 2012).

Biography:

BC Khoo graduated from the University of Cambridge with a BA (Honours, 1st Class with Distinction).

BC Khoo serves on numerous organizing and advisory committees for International Conferences/Symposiums held in USA, China, India, Singapore, Taiwan, Malaysia, Indonesia and others. He is a member of the Steering Committee, HPC (High Performance Computing) Asia. He has received a Defence Technology Team Prize (1998, Singapore) and the prestigious Royal Aeronautical Prize (1980, UK). Among other numerous and academic and professional duties, he is the Associate Editor of Communications in Computational Physics (CiCP) and Advances in Applied Mathematics and Mechanics (AAMM), and is on the Editorial Board of American Journal of Heat and Mass Transfer, Ocean Systems Engineering (IJOSE), International Journal of Intelligent Unmanned Systems (IJIUS), The Open Mechanical Engineering Journal (OME) and The Open Ocean Engineering Journal.

He is the PI of numerous externally funded projects including those from the Defense agencies like ONR/ONR Global and MINDEF (Singapore) to simulate/study the dynamics of underwater explosion bubble(s), flow supercavitation and detonation physics. His work on water circulation and transport across the turbulent air-sea interface has received funding from the then BP International for predicting the effects of accidental chemical spills. Qatar NRF has funded study on internal sloshing coupled to external wave hydrodynamics of (large) LNG carrier.

BC has published over 360 international journal papers, and over 360 papers at international conferences/symposiums. He has presented at over 115 plenary/keynote/invited talks at international conferences/symposiums/meetings.

Keynote Speech II

Prof. Jia-Yush Yen

National Taiwan University, Taiwan



Presentation:

"AI Based Servo Design for an Abbe Error Free Wafer Inspection System"

Abstract:

The demand for the shrinking IC process node not only drives the lithography technology toward sub-nanometer resolution, but it is also pushing the accompanying inspection technology toward the high-cost ultra-precision range. In this presentation, I will present the design considerations of an Abbe error-free high-speed wafer inspection system. The dual-axis system is capable of the traveling range of 500 mm. Our servo design enables a servo resolution smaller than 20 nm. I will discuss the concepts behind our servo design and discuss the various design methodologies adopted for our test. The first design approach is based on a chain scattering description to achieve h-inf servo design criteria. The second design approach is an AI-based servo parameter tuning. I will also present some discussions on the control results.

Biography:

Professor Jia-Yush Yen received his B.S. degree from National Tsing-Hwa University, Taiwan in 1980, the M.S. degree from the University of Minnesota, USA, in 1983, and the Ph.D degree from University of California, Berkeley in 1989, all in mechanical engineering. He then joined the Mechanical Engineering faculty of National Taiwan University where he served as the Department Chair, the director of Tjing-Ling Industrial Research Institute, and the Dean of the College of Engineering until 2017.

Prof. Yen also served as the Chair of the Automation Area for the Ministry of Science and Technologies, Taiwan, the president of the Chinese Institute of Automation Engineers, Taiwan (CIAE). He currently serves as the Present of the Chinese Automatic Control Society, Taiwan, the Director of the NTU Research and Development Center for Medical Devices, and the NTU Research Center for Intelligent Machines. He is a fellow of the ASME, Chinese Society of Mechanical Eng., the CIAE, the Robotics Society of Taiwan, and the Chinese Society of Mechanical Engineering. Dr. Yen received many awards, among them twice the Outstanding Research Award from Taiwan Ministry of Science and Technologies. This award is awarded only to the topmost researchers in their respected areas. Dr. Yen has also received numerous compliments from the government for his public service. He had also served as a consultant for many companies and institutes. His research interests are in the areas of mechatronic systems, computer peripherals, and nano-manipulations.

Invited Speech

Prof. Assim H. Yousif Al-Daraje

Philadelphia University, Jordan

Presentation:

" Effect of Combination Yaw Angle Variation and Base Bleeding for Tractor-Trailer Drag Reduction through Experimental Investigation and CFD "

Abstract:

This study focuses on the effect of variations in yaw angle and base bleeding configuration on the reduction of tractor-trailer drag. Detailed experimental and CFD investigations are introduced. Crosswind is used to simulate the yawed flow conditions. Three bleeding hole settings are arranged in the tractor base area. Experiments and CFD done using 1:32 scale model, after validating the results of the CFD extended to a full-scale model. In the CFD investigation, the structure and rotation of the flow around the tractor-trailer and the gap area are examined. Experimental investigations was Carried out in an open jet wind tunnel. The results showed that when the yaw angle is greater than 3 °, a drag reduction is clearly observed. At the yaw angle of 12 ° maximum drag reduction occurs in the form of drag coefficient is 19%, 21% and 23% for bleeding coefficient of 0.04, 0.05 and 0.06. Through the results of CFD predictions, the effects of bleed increase entrainment flow in the gap and reduce the wake area on the leeward side of the trailer and consequently produce a significant reduction in drag. This result is caused by a large flow separation zone that forms along the underside of the trailer when there is no bleeding which increases vehicle drag. The appropriate bleeding area of the tractor base is an alternative that allows in reducing the drag in the tractor-trailer gap.

Presentations at a Glance



Oral Presentation

◆ *Session I: Power Machinery and Applied Mechanics*

AA20-708: Direct Kinematics of a 3-PRRS Type Parallel Manipulator

A0038: Modelling of Tilting and Steering Control System for a Tadpole Three-Wheeled Vehicle

A008: The Effect of Welding Parameters on Joining Dissimilar Low Carbon Steel and 3CR12 Ferritic Stainless Steel by GTAW with ER308L Filler Metal

A0013: Effectiveness of Corner Modification to Optimize Aerodynamic Responses of Square Cylinder

A0014: Efficient Aerodynamic Optimization of Propeller using Hierarchical Kriging Models

A014: Fault Diagnosis of Planetary Roller Screw Mechanism Based on Bird Swarm Algorithm and Support Vector Machine

◆ *Session II: Electronics and Control Engineering*

AA20-207: Effect of Splitter and Endplates of Flow-Induced Vibration Characteristics of Cantilevered Rectangular and D-Section Prisms

A0009: Application of Image Program for the Analysis of Pupil Reaction in Security Systems

A0035A: Specular Surface Profile Measurement by using Fringe Reflection Technique

A0007: A Road Identification Method Based on Road Slope Information for Four-Wheel Independent Drive Electric Vehicles

A009: Decentralized Observer Based Exponential Stabilization for Linear Time-Invariant Interconnected Systems

A0030: Study of the Possibility of using Pupillography for Personnel Selection at Hiring

◆ *Session III: Materials and Mechanical Engineering*

A0025: Response Performance Characteristics of LRB Base Isolator for Cyclotron Building Due to Parts Sizing

A0028: The Increase of Efficiency in Robusta Green Coffee Bean Size Sorting Machine by Response Surface Methodology

A2004: Characteristics of Vibration Propagation on Passenger Car Monocoque Body Structure at Static Small Turbocharged Diesel Engine Speed Variation

A0024: Investigation of Surface Roughness in Incremental Sheet Forming of AA 2014-T6 using Taguchi's Method

A0026: Problems Analysis on Preparation of Oil and Gas Drilling Rig Installation for Next Operations Readiness after HPHT (High Pressure High Temperature) Well Operation

A013: Contact Analysis of Thread Pairs in a Planetary Roller Screw Based on Finite Element Method



Poster Presentation

- A006:** Development of High Speed and High Precision Stepping Scanning Platform in Ultra-High Flux Gene Sequencing Imaging System
- A007:** Thermodynamics Analysis of Roots Vacuum Pump
- A012:** Kinetic Sculpture Design using the Dynamic Cage
- A0010A:** A Study on Leakage Sensitivity Characteristics According to Matching Layer Structure of Ultrasonic Sensor
- A0011A:** A Study on the Receiving Sensitivity Characteristics of Ultrasonic Sensors According to the Gas Tank Leakage
- A0012A:** Effect of Design of Ring-Type and Disk-Type Conditioners on Pad Wear Profiles: Effect of Conditioner's Diameter
- A0015A:** Preliminary Study on Nano-Bubble and UV Assisted Chemical Mechanical Polishing
- A0023A:** Study on a Small Anaerobic Digester using Dried Biomass Waste (Kitchen Waste)
- A0036A:** Tunable Quasi-plasticity of Micro Smart Materials
- AA20-201E:** Research on Vibration Suppression for AGARD Wing Based on State Space Model
- AA20-202E:** Fibrous Orientation Effects on the Deformation and Stress of a Pigeon-Like Flapping-Wing Micro Aerial Vehicle Based on APDL
- AA20-203:** Star Sensor Layout Design Based on PSO
- AA20-204:** Data Exchange of Digital Twins Based on AML in Space Science Experiment Equipment
- AA20-204E:** Research on Anti-Vibration Based on Screw Fixation and Friction-Assisted Fixation Method for the Space Payloads
- AA20-205:** A Novel Hand Pallet Truck and Multi-objective Optimization Design of It's Lifting Mechanism
- AA20-205E:** Numerical Study on the Effectiveness of Vectoring Primary Flow with Dilator by using Microjet Actuator
- AA20-206:** Development Research and Crucial Technology Analysis of Scaled 3-Bearing Swivel Duct Nozzle Rotary Drive System
- AA20-206E:** Three-Dimensional Reconstruction of Continuous Tomographic ICT Images of Defective SRM
- AA20-207E:** Numerical Study on the Extreme Impact Load of Wavy-Water Ditching
- AA20-208E:** Research on Flatness Rapid Measurement Technology of Large Deployable Antenna
- AA20-210:** Numerical Simulation of the Aerodynamic Performance of the Backswept Blade of a Propeller at High Altitudes
- AA20-210E:** Wind Tunnel Testing Verification Method for Flight Test Pilots Emergency Departure from Commercial Aircraft
- AA20-211:** Numerical Study on the Aerodynamic Performance of the Rigid and Corrugated Forewing of Dragonfly in Flapping Flight
- AA20-212:** An Engineering Method for Computing the Aerodynamics Performance of Hypersonic Vehicle
- AA20-213:** Based on Bionic Optimization Design and Strength Analysis of The Tie Rod of Aircraft Landing Gear

AA20-214: Kinematics Analysis and Optimization of 6R Manipulator
AA20-215: Aerodynamic Coefficients Prediction for 122 mm Rocket by using Computational Fluid Dynamics
AA20-217: Research Progress of Anti-jamming Technology of Unmanned Aerial Vehicle(UAV) Data Link
AA20-222: The Investigation of Parameters on The Microstructure of Friction Stir Welded 1060Al/Cu Butt Joint with 10mm Thickness
AA20-223: Fluid-Structure Interaction Characteristics of Spin-On Fairing Structure of Aerodynamic Simulation Static Load
AA20-225: The Interference Analysis of the Terrestrial Components of International Mobile Telecommunications to the Satellite Mobile Communication System in S-band
AA20-701: Design and Verification of a New Test Bar Die for LPDC Process Based on Numerical Simulation
AA20-705: Microstructural Characterization of Coatings Produced by Selective Laser Melting of Ni-Powder on Titanium Alloy Substrate
A2002: Intelligent Classification of Wear Particles Based on Deep Convolutional Neural Network