

# **International Conference on Aerospace, Aerodynamics and Mechatronics Engineering (AAME 2022)**

Journal of Physics: Conference Series Volume 2364

Singapore  
22-24 July 2022

ISBN: 978-1-7138-6472-1  
ISSN: 1742-6588

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

This work is licensed under a Creative Commons Attribution 3.0 International Licence.  
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact the Institute of Physics  
at the address below.

Institute of Physics  
Dirac House, Temple Back  
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481  
Fax: 44 1 17 920 0979

[techtracking@iop.org](mailto:techtracking@iop.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## TABLE OF CONTENTS

Preface	
Peer Review Statement	
Research on space construction and selection method of space-based information support equipment .....	1
<i>Qing Chang, Desheng Liu, Yang Yang</i>	
Study on the relationship between the length of mixing layer and the characteristic scale of mixing layer in multi-strut ejector .....	11
<i>Letian Zhou, Wanwu Xu, Wei Ye</i>	
Fault Detection and Diagnosis of Gear Train Based on Motor Current Signature Analysis.....	19
<i>Junjie Diao, Yuan Tian, Yuelong Zhang, Shisheng Huang, Yijun Xin, Yulong Guo</i>	
Noise simulation of wake field of solid rocket motor.....	25
<i>Yuhang Gao, Jian Zheng</i>	
Technical Comparison Report on Aerospace Plane Propulsion System .....	34
<i>Siwei Li</i>	
Analysis of the Attachment Process of Bionic Spines Based on the Coupling of Discrete Elements and Multi-body Dynamics .....	43
<i>Ran Liu, Yu Xin Li, Haitao Luo, Miao Yu</i>	
Research on construction method of modular missile family general components based on self-organizing mapping .....	49
<i>Feiran Guo, Jianqiao Yu</i>	
Analysis of the influence of wave parameters on helicopter floating characteristics .....	55
<i>Ting Jiang, Sheng-zhe Shi, Xiao-long Zheng</i>	
Optimization Design of Propeller for Ultra-high-altitude Unmanned Aerial Vehicle.....	60
<i>Yuan Yao, Dongli Ma, Liang zhang, Xiaopeng Yang</i>	
3D Mapping and Positioning Technology of Lunar Environment Based on LiDAR .....	71
<i>Shi Biao Du, Xin Zhao, Hong Yong Fu</i>	
The Satellite Coverage Analysis is Based on a Combination of STK and MATLAB .....	80
<i>Cheng Zhang, Xuegang Wang, Yunzheng Liu</i>	
Study on the Influencing Factors of Modal Transformation of Continuous Rotating Detonation Wave Propagation.....	91
<i>Chen Shu, Wei Lin, Chenglong Yan, Qiang Shi</i>	
Mars Ascent Trajectory Optimization Based on Convex Optimization.....	99
<i>Yu Lan, Ji Li</i>	
The dynamic model of the high-thrust orbital maneuvering engine with storable propellant .....	106
<i>Qingdong Su, Jinjin Wang, Mingxia Yan, Zhensheng Sun, Bailin Zha, Weifeng Huang</i>	
Structural Optimization of Single Crystal Turbine Blade Based on Recrystallization Critical Stress.....	118
<i>Shifeng Li, Suling Chen, Siyuan Ren</i>	

Influence of brake-disc friction characteristics on anti-skid braking control system of aircraft.....	125
<i>Xiaoqiong Du, Bin Li, Linyin Luo</i>	
Application of LiDAR Survey Technology in Space Launch Sites.....	133
<i>Zhenzhen Ren, Qiang Wang, Yuchao Wang, Gaoyang Wu, Kang Wang, Wen'an Zhong</i>	
Comprehensive Risk Assessment of Satellite on-Orbit Operation .....	140
<i>Ru Feng, Heng Zheng, Bo Zhou, Zongsheng Xie, Xuemei Hu, Xia Shang, Lei Chen</i>	
General compensation control method of flexible manipulator driven by tendon-sheath mechanism .....	151
<i>Cunxiang Zhang</i>	
Design and optimization of booster gliding model guided rocket scheme .....	158
<i>Yifan Zhang, Meng Zhao, Zhengxin Tao, Wabu Mao, Shijin Luo, Xibin Bai, Ke Peng</i>	
Research on optimization of wave glider wing plate.....	171
<i>Ganlin Wang, Liucun Zhu, Hong Wan, Jiyue Wang, Haofeng Deng, Congwei He</i>	
Research on global calibration technology of pressure sensitive paint based on airtight chamber .....	178
<i>Jinkui Shang, Ronghuan Zhao, Zhaonan Xu, Hongjie Zhong</i>	
Active vibration control of a piezoelectric composite laminate .....	184
<i>Hongxia Chen, Wenguang Liu</i>	
Dynamic Response Analysis of the Aircraft Exposed to the Lateral Travelling Gust .....	193
<i>Zhiwei Jing, Chu Tang</i>	
Design and Analysis of the Wing Functioning as a Ramp for a Spitfire Flight Simulator .....	202
<i>Yichong Zhang</i>	
Physical and Chemical Analysis of Contact Points of relay on EMU .....	208
<i>Ping Sun, Junying Zhang, Anji Dong, Lei Zhang, Wenjun Wang, Nan Wu, Abo Dou</i>	
Application Research of Civil Aviation High Frequency Communication System.....	214
<i>Kaikai Si, Qing Lu, Xiaoyan Guo, Bin Gao</i>	
Advances in Resilience Engineering for Air Traffic Management Applications .....	222
<i>Jianmin Yi, Cunbao Ma, Jin Zhao</i>	
Study on bottom thermal environment of launch vehicle during high altitude flight.....	232
<i>Chen-geng Zhao, Zhong-yi Sun, Yi-fei Su, Yi-chen Wang, Gui-gao Le</i>	
Research on modular scheme of aviation emergency rescue for natural disasters .....	243
<i>Yueyue Li, Zhenlei Liu, Keyu Chen, Ji Qi, Chuang Li</i>	
Acceleration and performance analysis of a compressible Euler solver with CUDA .....	251
<i>Yuqiao Chen, Jianhan Liang, Meng Ding, Lin Zhang, Qingdi Guan, Xinxin Wang</i>	
Aerodynamic Analysis of Large Aspect Ratio Parafoil .....	256
<i>Chongxian Li, Xinfeng Li, Hongen Zhong</i>	
Simulation of Combustion Performance of High Salinity Organic Waste Liquid Incinerator.....	264
<i>Wen-Kai Li, yong-kang Qian, Xin-yu Qian</i>	
Numerical Study on the Water Takeoff Performance of Unmanned Seaplane .....	273
<i>Chengyi Wu, Yichong Wang, Aihua Wang, Hang Chen, Fei Zhang</i>	

Comparative study on the performance of turbulence models in flow separation of large expansion ratio nozzle .....	283
<i>Le Wang, Zhengyu Tian, Hang Yu, Ye Zhang, Hua Li</i>	
Design of mini airborne emergency power supply based on super capacitor.....	302
<i>Jian Li, Guoxing Li, Yonglin Guo</i>	
Overall design and sensitivity analysis of solar aircraft based on feasible region planning method .....	309
<i>Liang Zhang, Dongli Ma, Muqing Yang, Yuan Yao</i>	
Bearing capacity analysis of large deflection thin plate for civil aircraft .....	320
<i>Kaiwen Zhang, Zhouli He, Longhui Huang</i>	
A New Design of the 3D Deployable Solar Array in the Aerospace Field and Kinematic Analysis during Deployment.....	326
<i>Jiayi Sun</i>	
Design of a Foldable Solar Panel with Radial and Circumferential Folding Motion .....	338
<i>Jiaxuan He, Zeqi He, Cexiao Hu</i>	
Bidirectional coupling method for solving the electromagnetic-joule thermal properties of electromagnetic launcher.....	354
<i>Pengxiang Zhang, Tao Shu</i>	
The Bricard Linkage Network Constructed by Bennett Linkage: Design Method and Kinematic Analysis.....	360
<i>Ziyi Huang, Wentao Jiang, Xuan Pan, Zekai Tao</i>	
The Bellows Designing Method of Divided Working Conditions for Launch Vehicle .....	370
<i>Yi Zhang, Xu Li, CongFei Wang, Wei Huang, Gang Shi, Yi Wang</i>	
Numerical simulation of jet atomization process of swirl nozzle.....	381
<i>Na Gao, Xiaobin Zhang</i>	
Formation of H <sub>2</sub> CO and CH <sub>3</sub> OH in the Protoplanetary Disks .....	389
<i>Lin Xiao, Xia Liu, Li Zhang</i>	
According transformer parameters to design a high voltage power .....	397
<i>Junling Zhang, Renbo Jin</i>	
Research on drag reduction characteristics of the surface of springtail cuticle .....	402
<i>Benshuai Fu, Haiyan Xiao, Bingju Lu, Liping Qin, Zhu Zhu</i>	
Dynamic pressure-based rocket PID parameters adaptive adjustment method and application.....	411
<i>Meng Zhao, Yifan Zhang, Zhengxin Tao, Yiyue Liu, Runqi Li, Ke Peng</i>	
Dynamic load identification based on piecewise fitting trend term and smooth curve .....	418
<i>Wei Gao, Zhuoyu Ren</i>	
Numerical Calculation of Added Mass of Stratospheric Airship with X-Shaped Tail .....	424
<i>Sheng-zhe Shi, Ting Jiang, Fan Wang, Xiao-long Zheng</i>	
The Numerical Simulation of Cavitation Phenomenon in a Venturi Tube.....	432
<i>Zibo Zhou, Qinglian Li, Tao Liang, Shaotian Gong</i>	
The category of black holes and state-of-art detection scenarios .....	442
<i>Zhenyu Peng</i>	

The Principle and State-of-Art Approach for Black Hole Detection .....	449
<i>Lingyan Guan, Xianzhe Tang, Jialing Tian, Jiayi Wu</i>	
The principle and state-of-art applications of Hawking radiation .....	462
<i>Chunyu Guo</i>	
Design of INS/GNSS Precise Posture Measurement and Positioning System for Complex System .....	469
<i>Rong Han, Jianfen Yang, Yumin Tang, Liben Yang</i>	
A mission planning method for sunlight avoidance period of GEO optical remote sensing satellite .....	475
<i>Xiaoxia Shi, Xindong Li, Yu Wang</i>	
Habitability of Exoplanets around Black Hole .....	481
<i>Zhe Hu, Qingyao Jiang, Miao Li</i>	
Experimental study on ignition and lean blowout characteristics of high temperature rise combustor.....	490
<i>Rui Luo, Yi Fu, Jintao Jiang, Pengyu Shi, Penghui Liu, Zhisheng Wang, Wei Fan</i>	
The State-of-art Analytical Models and Detectors for Black Holes .....	496
<i>Zehua Yu</i>	
Simulation research on positioning acquisition of field rescue equipment based on LoRa.....	502
<i>Pengfei Kou, Mingyao Chen, Fei Wang</i>	
Design and Simulation of a Position and Average Velocity Closed-loop Control Method of a Hydraulic Servo System.....	509
<i>Xuyao Mao, Wei Duan, Chao Xiang, Chao Wu, Ze Wang</i>	
Research on Common Mode Analysis Method in System Safety Analysis.....	515
<i>Dawei Li, Jianguo Gao, Zhongyuan Zhang, Jihui Xu</i>	
Numerical study of air-breathing two-phase rotating detonation engine under Ma 6 flight conditions .....	520
<i>Chenglong Yan, Wei Lin, Chen Shu, Yue Zhi, Wei He</i>	
Research on Road Extraction Algorithm Based on Improved Otsu's Thresholding Method .....	527
<i>Yanmei Wang, Mingyu Lu, Pengfei Feng</i>	
Numerical Simulation of Jet Interaction Flow Field with Different Flow Rates .....	533
<i>Yuwei Liu, Xinchen Wang, Kangkang Li, Yaofeng Liu</i>	
Study of Combustion Mode Identification Method on Dual-Mode Solid Rocket Scramjet.....	541
<i>Libei Zhao, Zhixun Xia, Likun Ma, Chaolong Li, Yunchao Feng, Binbin Chen, Pengnian Yang</i>	
Numerical simulation study on the optimization of the central ejector intake tube.....	548
<i>Qi Jing, Wanwu Xu, Wei Ye, Zhenkang Zhang</i>	
Rocket Recovery Carbin Section Passive location based on whale optimization algorithm .....	556
<i>Chao Lu, pei Wang, Zhiyuan Dong, Zhihui Ye</i>	

## Author Index