2019 IEEE 10th International Conference on Mechanical and Aerospace Engineering (ICMAE 2019)

Brussels, Belgium
22 – 25 July 2019

IEEE Catalog Number: CFP19G51-POD
ISBN: 978-1-7281-5536-4

Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number: CFP19G51-POD
ISBN (Print-On-Demand): 978-1-7281-5536-4
ISBN (Online): 978-1-7281-5535-7

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
E-mail: curran@proceedings.com
Web: www.proceedings.com

2019 IEEE 10th International Conference on Mechanical and Aerospace Engineering

ICMAE 2019

Table of Contents

Preface……..…..xi

Conference Committees…….xii

◆ Aviation/Aerospace

The Research on Modern Civil Jets Top Level Design Requirements Based on Systems Engineering Method 1

Yue Wang, Dan Gao

Modeling and Simulation of Diaphragm Oxygen Regulator Pressure Control system 6

Rui Pan, Guiping Lin, Yu Zeng, Xue Yang, ZhiGao Shi

Simulation Research on Rapid Decompression of Aircraft Cabins 11

Tong Zhang, Guiping Lin, Xueqin Bu, Chenlu Jia, Chenhui Du

Overall Parameters Sensitivity Analysis of Solar-Powered Aircraft Based on MDO 18

Yiyuan Ma, Wei Zhang, Ke Li

Autonomous Entry Guidance based on 3-D Gliding Trajectory Analytical Solution 24

Wanqing Zhang, Wanchun Chen, Wenbin Yu, Chaoyue Zhao

Using Inflatable Structures to Remove Space Debris from Orbit 32

Vsevolod V. Koryanov, Victor P. Kazakovtsev, Alexey G. Toporkov, Anton A. Nedogarok

A Cleaner Design of Nuclear-Powerd Hybrid Aero Engine 37

Xinze Xu, Guanxin Hong

Multivariable Steady State Control of Aeroengine Based on Backstepping Method 42

Xin-yue Ma, Lin-feng Gou, Chen-yang Zhao, Ying Wang

Pilot-Induced Oscillation Analysis for Receiver in Flying-Boom Aerial Refueling via Mission-Oriented Evaluation 47

Haipeng Yin, Lixin Wang, Ting Yue, Hailiang Liu

Multifield Coupling Dynamics of Large Truss Structure for Space Applications 52

Wei-Jie Li, Yong-Sheng Wu, Qing-Sheng Wei, Cheng Wei

Numerical Investigation of Aerodynamic Loads on a Flexible Wing 57
Z. Toor, T. I. Khan, Bilal Mufti, U. Shehzad, J. Masud, O. Khan
Experimental and Numerical Investigation of Curve Section Stringer/skin Runout Under Tensile Load 62
Yao Wang, Zhidong Guan, Xiaodong Wang, Fengyang Jiang, Xiaodong Liu
Optimization of an Airfoil Characteristics to Minimize the Turn Radius of a Small Unmanned Aerial Vehicle 67
Suleyman Murat Koroglu, Ibrahim Ozkol
The Research of Terminal Optimal Guidance Law of MANEUVERING Vehicle with Multiple Constrains... 74
Li Qiang, Wang Yonghai, Li Jun, Zhang Xi, Qin Xuguo
Flow Field Analysis of a Diverterless Supersonic Inlet using Embedded LES Methodology 79
Bilal Mufti , T.I. Khan , J. Masud, Z. Toor
Forming the Technical Concept of Aircraft Power Systems of the Perspective Aircraft Taking Into Account the Outside Mechanical Impacts 85
Arbuzov I. V., Serebryanskii S. A., Strelets D. Y.
Statistical Analysis of Spacecraft Failure in Full-Life Based on STED 89
Xin-Yan Ji, Jing Wang
Methods for the Design of Modern On-Board Systems of Advanced Aircraft 97
Smagin D. I., Savelev R. S., Satin A. A.
Ascent Performance Analysis for High Altitude Super Pressure Balloon in Real Wind Field 102
Du Huafei, Wu YiFei, Lv Mingyun
Constellation Design and Low-Thrust Station-Keeping Strategy for Satellites in Inclined Geosynchronous Orbits 108
Lincheng Li, Jingrui Zhang, Ioannis Gkolias, Camilla Colombo
Analysis of Stratospheric Airship Endurance Strategy 115
Lanchuan Zhang, Cong sun, Mingyun Lv
An Optimization Method for Non-augmented Supersonic Cruise Performance of Turbofan Engine 122
Xin-yue Ma, Lin-feng Gou, Tian Tan
Hyperbolic Navier-Stokes Systems for Three-Dimensional Viscous Flow in Edge-Based Cell-Vertex Unstructured Solver 128
Shuai Lou, Zhao-wei Wang, Yuan Zhao, Bo-xi Lin, Chao Yan
Structural Design and Aerodynamic Characteristic of an Innovative Split Aileron Configuration..... 133
Anmin Zhao, Dongyu He, Dongsheng Wen
An Unmanned Aerial Vehicle Path Planning Method Based on the Elastic Rope Algorithm..... 137
Jingfan Tian,Yankai Wang,Dongdong Yuan

Experimental Study of the Suppression of Wing-Body Rock by Spanwise Blowing 142
Kun Chen, Yizhang Dong, Zhiwei Shi, S. X. Tong, J. Sha
Adaptive Simulation of Micro-Turbojet Engine Component Characteristics 147
Jiang Yu-xiang, Chen Yu-chun
Bank Angle Protection Methods for a Wing-in-Ground Craft 153
Kun Yang, Lixin Wang, Ting Yue, Hailiang Liu
Research on Overall Design of Turboshaft Engine Based on Data Analysis Method 158
Chen Min-ze,Chen Yu-chun, Fan Wei, Zhang Shao-feng, Li Xia-xin
An Efficient Implicit High-order Flux Reconstruction Method by Automatic Differentiation using Operator Overloading for Flow Simulation on Unstructured Hexahedral Grids 164
Lin Bo-xi, Zhang Liang, Chen Shu-sheng, Li Bing, Jiang Zhen-hua
Research on Control Law of High Speed Turbofan Engine 171
Tian Tan, Yu-chun Chen, Hao-min Li, Ke-ran Song
Numerical Analysis of Aerodynamic Heating of Two-Dimensional Spiral Mod 177
Hao Jingke, Zhang Liang, Shi Jiatong
Application of Inverse Design Method in Transonic Turbine Blade 181
Jinguang Li, Hu Wu
Multi-Rigid-Body Dynamics Modeling and Controller Design for a Connected UAV Formation 187
Mingzhe Chen, Zhou Zhou, Rui Wang
Load Reduction Mechanism of Cone Wall Fuse Caused by Fan Blade Off 193
Hou Lizhen, Liao Mingfu, Jia Runtian

◆ Control Systems

Marionette-Like Control for Intuitive Tele-operation 198
Yoko Ishida, Mitsuharu Matsumoto
Optimization of Vehicle Suspension System Using Genetic Algorithm 203
Sikandar Khan, Mamon M. Horoub, Saifullah Shafiq, Sajid Ali, Umar Nawaz Bhatti
A Rigorous Orbit Attitude Estimation Algorithm for Low-Earth-Orbit Spacecrafts 208
Lijun Zhang, Zhicheng Zhu, Wei Li, Xinqi Wang, Jianan Ma, Hengnian Li
Study on RCD Clamping Circuit in Satellite Electrical Power System 213
Lin Wenli, Feng Shuo, Li Xiaofei, Tian Peng, Ma Jinyuan
Impact of Powder-mixed Electrical Discharge Machining on Surface Hardness of AISI D3 Die Steel 218
Bidyut Kumar Panda, Sanjeev Kumar
Design of Flight Control System Based on Novel State Variables 223
Ryosuke Matsushima, Kenji Uchiyama, Kai Masuda

An Intercept Guidance Law with Impact-Angle-Constrained Based on Linear Gauss Pseudospectral Model Predictive Control 229

Xingcai He, Wanchun Chen, Liang Yang

Multibody Dynamic Characteristics of Wingtip-jointed Composite Aircrafts 236

Dongxu Liu, Changchuan Xie, Chao An, Guanxin Hong

Adaptive Algorithm to Determine the Coverage Belt for Agile Satellite with Attitude Maneuvers 241

Huijiang Wang, Chao Han, Shenggang Liu, Yu Sun, Hong Zhang

A Solution to the Problems of Appearance Optimization for "Flame blocker"-type Units Using Advanced Production Technologies 247

Zyazeva T. Y., Smagin D. I., Savelev R. S.

Output performance Optimization of High-altitude Airship based on Attitude and Solar Array Layout ... 252

Weiyu Zhu, Yuanming Xu

Controlling a Chain of Integrators with Constrained Actuation Using Exponential Activation Functions 258

Espen Oland, Raymond Kristiansen

A Kriging Based Framework for Rapid SatellitetoSite Visibility Determination 262

Yi Gu, Chao Han, Xinwei Wang

Hardware-in-the-loop Simulation Platform for Fault Diagnosis of Rocket Engines 268

Wanli Zhao, Yingqing Guo, Jing Yang , Hao Sun

Sparse Representation Based Approach for Acoustic Emission Signal Identification in Glass-Epoxy Composites 274

A. Satour, S. Montrésor, M. Bentahar

A Design Method of Steady State Control Law for Civil Turbofan Engine 279

Ke-ran Song, Yu-chun Chen,Tian Tan, Feng-ping Chen

Configuration Planning of Space Cellular Robotic System 285

Hang Zhao, Hao Tian, Yang Zhao, Dexiao An

Design of Fault Diagnosis System for Pulse Detonation Engine 292

Wang Bin-kui, Li Jiang-hong, Zhang Wen-long, Fan Wei, Wang Ke, Fu Meng

Test Method for SADA's Servo Control System of China Space Station 297

Zhen Zhao, Guoping Chen, Zhen Zhao, Bi Wang

Research on Acoustic Emission Source Localization of Carbon Fiber Composite Plate Based on Wavelet Neural Network 302

Wang Yin-ling, Li Hua-cong

Path Planning and Tracking of an Autonomous Car with High Fidelity Vehicle Dynamics Model and Human Driver Trajectories 306

Husain Kanchwala

◆ Mechanical

Early Rolling Bearing Fault Detection Using A Gini Index Guided Adaptive Morlet Wavelet Filter 314

M. N. Albezzawy, M. G. A. Nassef, E. S. Elsayed, A. Elkhatib

Experimental Investigation into Convective Heat Transfer of Boger Fluids by Elastic Turbulence within the Serpentine Channel 323

Haie Yang, Dongsheng Wen

Numerical Experiment of Flow around a Flat Plate with Round Edges 328

Yoshifumi Yokoi

Investigating Mechanical Properties of Polyacetal/Graphene Nanocomposites by a Structural-Mechanical Model 333

Hamid Asadollahi Yazdi, Vali Parvaneh, Mahmoud Shariati

Progressive Damage Analysis of Deployable Composite Cylindrical Thin-Walled Hinges 338

Liangwei Su, Beibei Sun, Yingjie Zhang

Adaptive Backstepping Approach for 2-DOF Telescopes Despite Unknown Wind Disturbance 343

Ali Cem Unal, Cemal Tugrul Yilmaz, Gokhan Kararsiz, Onur Keskin, Cahit Yesilyaprak

Scale Model Design of a Turboshaft Engine with Mid Turbine Frame 349

Zhun Liu, Mingfu Liao

Modified Independent Modal Space Control for Large-Flexible Asymmetrical Resonant Structures 354

Peng Zhang, Fangpo He

A Simplified Model for the Thermal Behavior Prediction of Inflatable Hangar 359

Yifei Wu, Huafei Du, Mingyun Lv, Zhongcheng Wang

Simultaneously Identification of Thermal Conductivity and Heat Capacity of Thermal Insulation Tile 365

Yulin Sun, Hongli Ji, Jinhao Qiu

Structural Design and Simulation of the Oxygen Regulator 370

Jinhai Hu, Dongsheng Jiang, Haichuan Jin, Guiping Lin, Bingjun Su, Junjie Gan, Anmin Zhao

Three-Dimensional CFD Investigation of Performance and Interference Effect of Coaxial Propellers 376

Young Tae Kim, Chang Hwan Park, Hak Yoon Kim

Numerical Investigation of a New Unsteady Control Method to Suppress Tip Clearance Flow in Compressors 384

Yuxuan Yang, Zheng Xie, Guoping Huang, Zhiyuan Zhang, Shuli Hong

Comparison of Different Reconstruction Schemes for Numerical Simulation of Unsteady Cavity Flow .. 390

Kailing Zhang, Hongrui Liu, Chao Yan

Numerical Investigation of a VTOL Power Unit Based on Gas-Driven Fan 397

Yang Zhou, Guoping Huang, Lei Li

Co-simulation of Aircraft Engine Fuel and Oil System 404
Hao Sun, Yingqing Guo, Wanli Zhao
Research on Nonlinear Oscillation Suppression and Mixing Characteristics of RVABI Base on Bypass Pressure Fluctuation 409
Li Chao, Huang Guoping
Design and Characteristic Calculation of Combustion Chamber of Hydrogen-Fueled Scramjet Based on "Constant Static Temperature" Heating Method 416
Hao-min Li, Yu-chun Chen, Tian Tan, Jin-feng Du, Jun-hui Zhou, Chi Liu
Calibration Method and Test Result Analysis of High Temperature Film Temperature Sensor 422
Su Xinming, An Wanqing, Liu Xiaoning, Liu Chang, Wang Qingyu, Zhang Xi
Application of a New Shock-Stable Scheme for Supersonic Combustion Flows 428
Yongkang Zheng, Yue Zhou, Shusheng Chen, Chao Yan
Influence of Different Fuels on Scramjet Engine Performance 434
Wang Zhi-hua, Chen Yu-chun, Wang Xiao-dong, Chen Min-ze, Zhou Jun-hui, Liu Chi
A Visual Study on Coherent Structures in Flat-plate Turbulent Boundary Layer 439
Chao Wu, Hui Guo, Yanze Li
Study on the Influence of Heat Transfer Effect on Performance Simulation of Engine Transition State ... 443
Feng-ping Chen,Yu-chun Chen,Ke-ran Song,Yu-sang Li
Optimal Placement of Actuators for Active Vibration Control Using EER and Genetic Algorithm 449
Jianding Chen, Jinhui Jiang, Ke Wang, Fang Zhang
Study on the Influence of Geometry Configuration of Combustion Chamber on the Performance of Hydrogen-Fueled Scramjet Engine 454
Hao-min Li, Yu-chun Chen, Tian-hao Zhang
Design and Simulation Analysis of Rocket Sled Vibration Reduction 459
Xinchao Wang, Ke Wang, Yuanyuan Yu
Effect of Geometry and Operation Conditions on Transient Response Characteristics for the Static Cavity 464
Jianping Hu, Zhenxia Liu, Pengfei Zhu, Yaguo Lyu
Dynamic Modeling and Simulation of Washing Machine Suspension System 470
Yidan Qu, Jinhui Jiang
Numerical Study on the Ejector Structure of Deaerator 475
Qiang Tian, Zhen-xia Liu, Jian-ping Hu
Experimental Study on Oxygen Production Performance of Multi-bed Molecular Sieves 482
Yu Zeng, Xue Yang, Rui Pan, Bing Sun, Dabo Wan

Active Fault-tolerant Control of Auxiliary Power Unit Based on Analytical Redundancy and Heterogeneous Redundancy Design 486

Kai Peng, Zhaorong Zhang, Fan Yang, Chunbo Jiao

Simulation and Comparison on Energy Consumption between Electric and Diesel Buses: Feasibility Study on Electric Rubber-Tire Bus Potential in Chiang Mai 490

Niti Kammuang-lue, Jirawat Boonjun

Study on Factors Affecting the Position of Low-Pressure Rotor Transition State Line of Double-Rotor Engine 497

Li Yu-sang, Chen Yu-chun, Chen Fengping, Zhang Tianhao, Chen Minze

Three-year Performance Test of a Dual Compensation Chamber Loop Heat Pipe 502

Huanfa Wang, Guiping Lin, Xiaobin Shen, Hongxing Zhang

◆ Manufacturing

Cutting Performance in Threading Turning and Grooving Turning of Ti-6Al-4V Alloy with a High-Pressure Coolant Supply 507

Tadahiro Wada

Research on Key Technologies for High-Precision Whole Flexible Machining of Large-Scale Multi-supports Cabin 513

Zhang Jiabo, Wen Ke, Yue Yi, Yang Jizhi, Zhou Yinghao

A Study on the Durability Improvement of the Connection Passage Assembly for Railway Vehicles 518

Chul-Su Kim, Jae Moon Kim

Research on Flow Fields of Electro-Arc Heater 523

Qin Xuguo, Shui Yongtao, Wang Yonghai, Chen Gang, Li Qiang

Cure Kinetics Characterization of Epoxy Resin by Piecewise Model Fitting Method 528

Xiaodong Liu, Zhidong Guan, Xiaodong Wang, Yao Wang, Fengyang Jiang

Optical fiber Mach-Zehnder Interferometric Strain Sensor Based on Concatenating Two Micro Cavities Fabricated by A Femtosecond Laser 533

Jinpeng Yang, Sumei Wang, Xiaoguang Chen, Xiaofeng Zou, Yuxiao Liu, Ruo Lin, Yimin Wang, Yang Chen

Self-Heating Effect of HTPB Propellant during Fatigue 539

Xin Tong, Issam Doghri, Jin-sheng Xu, Xiong Chen

Optimization of Comprehensive Stiffness Performance Index for Industrial Robot in Milling Process 544

Jiabo Zhang, Jizhi Yang, Yi Yue, Ke Wen, Yinghao Zhou

Effect of Temperature on Local Stresses in Magnetoelectric Composites 550

Meghana Sudarshan, Punya D Gowda, Benjamin Rohit, Nandini B Nagaraju

Research of Young's Modulus of the Simple Lattice Structures Made from Plastics 555
Katarina Monkova, Peter Monka, Jozef Tkac, Jozef Torok, Oldrich Suba, Milan Zaludek
Numerical and Experimental Investigation of Drilling of Ti6Al4V Alloy 559
Nawel Glaa, Kamel Mehdi
Inverse, Direct Kinetics and Differential Kinematic Control of Parallel Robot with Six Degrees of Hexa Freedom – Hunt 563
Angie J Valencia, Mauricio Mauledoux, Claudia Castañeda
Clustering Analysis of Acoustic Emission Signals in 2D-C/SiC Tensile Damage Using Genetic Simulated Annealing Optimization Algorithm 568
Wang Yin-ling, Li Hua-cong
A Method for Manufacturing Navigation Startable of Star Sensor Based on Darkness-and-Density Factor 573
Xunjiang Zheng, Shuodong Sun, Songhang Ye, Gao Yuan, Zhilong Ye
Numerical Study on the Effect of Slot-Type Casing Treatment in a Transonic Compressor 580
Zhidong Chi, Wuli Chu, Haoguang Zhang
PID Based Control of Electric Vehicle Drive Line with Backlash 590
Zeeshan Ali Akbar, Hameed Ullah, Fahad Mumtaz Malik, Anjum Saeed, Amer Aziz
Research on Incremental Forming Technology for Integral Panels with Flanges 596
Xu Ai-jun, Zhang Yu-liang, Li Cai-ling, Jia Yue-rong, Zhao Chang-xi
Identification of Warping Modes of Thin-Walled Beams with Closed Cross-Sections 602
Lei Zhang, Qi Zhu, Aimin Ji, Weidong Zhu
Robust Incremental Backstepping Controller for the Attitude and Airspeed Tracking of a Commercial Airplane 607
Nuno Miguel Guerreiro, Alexandra Moutinho