

Mechanisms and Machine Science

Jianrong Tan · Yu Liu ·
Hong-Zhong Huang · Jingjun Yu ·
Zequn Wang *Editors*

Advances in Mechanical Design

The Proceedings of the 2023
International Conference on Mechanical
Design (ICMD 2023)




 Springer

The Springer logo features a white chess knight piece on a pedestal, positioned to the left of the word "Springer" in a white, serif font.

Mechanisms and Machine Science

Volume 155

Series Editor

Marco Ceccarelli , Department of Industrial Engineering, University of Rome Tor Vergata, Roma, Italy


Advisory Editors

Burkhard Corves, RWTH Aachen University, Aachen, Germany

Victor Glazunov, Mechanical Engineering Research Institute, Moscow, Russia

Alfonso Hernández, University of the Basque Country, Bilbao, Spain

Tian Huang, Tianjin University, Tianjin, China

Juan Carlos Jauregui Correa , Universidad Autonoma de Queretaro, Queretaro, Mexico

Yukio Takeda, Tokyo Institute of Technology, Tokyo, Japan

Sunil K. Agrawal, Department of Mechanical Engineering, Columbia University, New York, NY, USA

This book series establishes a well-defined forum for monographs, edited Books, and proceedings on mechanical engineering with particular emphasis on MMS (Mechanism and Machine Science). The final goal is the publication of research that shows the development of mechanical engineering and particularly MMS in all technical aspects, even in very recent assessments. Published works share an approach by which technical details and formulation are discussed, and discuss modern formalisms with the aim to circulate research and technical achievements for use in professional, research, academic, and teaching activities.

This technical approach is an essential characteristic of the series. By discussing technical details and formulations in terms of modern formalisms, the possibility is created not only to show technical developments but also to explain achievements for technical teaching and research activity today and for the future.

The book series is intended to collect technical views on developments of the broad field of MMS in a unique frame that can be seen in its totality as an Encyclopaedia of MMS but with the additional purpose of archiving and teaching MMS achievements. Therefore, the book series will be of use not only for researchers and teachers in Mechanical Engineering but also for professionals and students for their formation and future work.

The series is promoted under the auspices of International Federation for the Promotion of Mechanism and Machine Science (IFTOMM).

Prospective authors and editors can contact Mr. Pierpaolo Riva (publishing editor, Springer) at: pierpaolo.riva@springer.com

Indexed by SCOPUS and Google Scholar.

Jianrong Tan · Yu Liu · Hong-Zhong Huang ·
Jingjun Yu · Zequn Wang
Editors

Advances in Mechanical Design

The Proceedings of the 2023 International
Conference on Mechanical Design
(ICMD 2023)

 Springer

Editors

Jianrong Tan
School of Mechanical Engineering
Zhejiang University
Hangzhou, Zhejiang, China

Hong-Zhong Huang
School of Mechanical and Electrical
Engineering
University of Electronic Science
and Technology of China
Chengdu, Sichuan, China

Zequn Wang
University of Electronic Science
and Technology of China
Chengdu, Sichuan, China

Yu Liu
School of Mechanical and Electrical
Engineering
University of Electronic Science
and Technology of China
Chengdu, Sichuan, China

Jingjun Yu
School of Mechanical Engineering
and Automation
Beihang University
Beijing, China

ISSN 2211-0984

Mechanisms and Machine Science

ISBN 978-981-97-0921-2

<https://doi.org/10.1007/978-981-97-0922-9>

ISSN 2211-0992 (electronic)

ISBN 978-981-97-0922-9 (eBook)

© The Chinese Mechanical Engineering Society 2024

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.

The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Paper in this product is recyclable.

Organization and Committees

Organizers

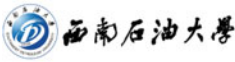
The Mechanical Design Institution of Chinese Mechanical Engineering Society
University of Electronic Science and Technology of China

Co-organizers

Southwest Jiaotong University
Sichuan University
China Machine Press
Southwest Petroleum University
Chengdu University of Technology
Sichuan University of Science and Engineering
Southwest University of Science and Technology
Xihua University
Chengdu University
National Demonstration Center for Mechatronics and Control Engineering Education
Key Laboratory of Oil and Gas Equipment, Ministry of Education

Sponsors

Journal of Mechanical Engineering
Journal of Machine Design
Chinese Journal of Engineering Design
Springer



Conference Organization

Chairman

Jianrong Tan, Academician of Chinese Academy of Engineering, Zhejiang University, China; the Mechanical Design Institution of Chinese Mechanical Engineering Society, China

Co-chairman

Hong-Zhong Huang, University of Electronic Science and Technology of China, China

Program Committees

Zongquan Deng, Harbin Institute of Technology, China
 Changle Xiang, Beijing Institute of Technology, China
 Baoyan Duan, Xidian University, China
 Jianbin Luo, Tsinghua University, China
 Zhongde Shan, Nanjing University of Aeronautics and Astronautics, China
 Shuxin Wang, Chongqing University, China
 Peihua Gu, Tianjin University, China
 Dingxuan Zhao, Yanshan University, China

Xiangyang Zhu, Shanghai Jiaotong University, China
Zhifeng Liu, Hefei University of Technology, China
Yimin Zhang, Shenyang University of Chemical Technology, China
Wenhua Chen, Zhejiang Sci-Tech University, China
Hongwei Zhao, Jilin University, China
Feng Gao, Shanghai Jiaotong University, China
Xu Han, Hebei University of Technology, China
Jun Hong, Xi'an Jiaotong University, China
Liang Gao, Huazhong University of Science and Technology, China
Caichao Zhu, Chongqing University, China
Xiaohua Zhu, Southwest Petroleum University, China
Yongsheng Zhao, Yanshan University, China
Jorge Angeles, McGill University, Canada
Shaoping Bai, Aalborg University, Denmark
Wei Chen, Northwestern University, USA
Marco Ceccarelli, University of Rome Tor Vergata, Italy
Xiaoping Du, Indiana University–Purdue University Indianapolis, USA
Isaac Elishakoff, Florida Atlantic University, USA
Dongming Gan, Purdue University, USA
Jeff Ge, Stony Brook University, USA
Guangbo Hao, University College Cork, Ireland
Sami Kara, University of New South Wales, Australia
Yoram Koren, University of Michigan, USA
Shuting Li, Shimane University, Japan
Stephen Lu, University of Southern California, USA
Paul Maropoulos, Queen's University Belfast, UK
Shaker A. Meguid, University of Toronto, Canada
Moshe Shpitalni, Israel Institute of Technology, Israel
Rainer Stark, Technische Universität Berlin, German
Haijun Su, The Ohio State University, USA
Nam Pyo Suh, Massachusetts Institute of Technology, USA
Teresa Zielińska, Warsaw University of Technology, Poland
Matteo Zoppi, University of Genova, Italy
Yangzhi Chen, South China University of Technology, China
Xilun Ding, Beihang University, China
Chunsheng Feng, The Mechanical Design Institution of CMES, China
Haibo Gao, Harbin Institute of Technology, China
Peiqi Ge, Shandong University, China
Weizhong Guo, Shanghai Jiaotong University, China
Qingkai Han, Northeastern University, China
Bin He, Shanghai University, China
Liang Hou, Xiamen University, China
Weifei Hu, Zhejiang University, China
Hong-Zhong Huang, University of Electronic Science and Technology of China, China

Chao Jiang, Hunan University, China
Baotong Li, Xi'an Jiaotong University, China
Liangsheng Li, Beijing Institute of Control Engineering, China
Qinchuan Li, Zhejiang Sci-Tech University, China
Xiaobing Li, Nanchang University, China
Yingguang Li, Nanjing University of Aeronautics and Astronautics, China
Geng Liu, Northwestern Polytechnical University, China
Hui Liu, Beijing Institute of Technology, China
Jie Liu, Hunan University, China
Rongqiang Liu, Harbin Institute of Technology, China
Xinjun Liu, Tsinghua University, China
Yu Liu, University of Electronic Science and Technology of China, China
Zhenyu Liu, Zhejiang University, China
Xueguan Song, Dalian University of Technology, China
Tao Sun, Tianjin University, China
Shuiguang Tong, Zhejiang University, China
Congsi Wang, Xidian University, China
Shuqin Wang, Journal of Mechanical Engineering, China
Yanhui Wang, Tianjin University, China
Chaoqun Wu, Wuhan University of Technology, China
Renbin Xiao, Huazhong University of Science and Technology, China
Jianwen Yan, Hefei Metalforming Intelligent Manufacturing Co., Ltd, China
Jianzhong Yang, Beijing Institute of Spacecraft System Engineering, China
Yanan Yao, Beijing Jiaotong University, China
Jingjun Yu, Beihang University, China
Xuejun Zheng, Xiangtan University, China
Bin Zi, Hefei University of Technology, China

Organizing Committee Chair

Hong-Zhong Huang, University of Electronic Science and Technology of China, China

Executive Chair

Yu Liu, University of Electronic Science and Technology of China, China

Organizing Committee Co-chairs

Qichun Zhao, Sichuan Machinery Research and Design Institute, China

Jun Luo, Chongqing University, China

Linmao Qian, Southwest Jiaotong University, China

Jie Wang, Sichuan University, China

Chuanjun Han, Southwest Petroleum University, China

Organizing Committees

Guangzhong Hu, Sichuan University of Science and Engineering, China

Junfu Zhang, Xihua University, China

Jiaxin Yu, Southwest University of Science and Technology, China

Xingqiao Deng, Chengdu University of Technology, China

Lijia Xu, Sichuan Agricultural University, China

Wei Feng, Chengdu University, China

Xiaoyan Huang, Chengdu Technological University, China

Xiaobing Huang, Panzhihua University, China

Xinzhen Ding, The Mechanical Design Institution of Chinese Mechanical Engineering Society, China

Chunsheng Feng, China Machine Press, China

Baotong Li, Xi'an Jiaotong University, China

Zheming Tong, Zhejiang University, China

Zequn Wang, University of Electronic Science and Technology of China, China

Dequan Zhang, Hebei University of Technology, China

Mi Xiao, Huazhong University of Science and Technology, China

Pengbing Zhao, Xidian University, China

Yanfeng Li, University of Electronic Science and Technology of China, China

Huanwei Xu, University of Electronic Science and Technology of China, China

Haiqing Li, University of Electronic Science and Technology of China, China

Ning-Cong Xiao, University of Electronic Science and Technology of China, China

Xiaoling Zhang, University of Electronic Science and Technology of China, China

Tangfan Xiahou, University of Electronic Science and Technology of China, China

Jun Wu, University of Electronic Science and Technology of China, China

Preface

Driven by Industry 4.0 techniques, including cyber-physical systems, artificial intelligence, big data, Internet of Things, cloud computing, and so forth, there is a rapid acceleration in the integration of these new technologies with traditional mechanical design paradigm. With the aim of offering researchers and practitioners all around the world a forum to comprehend the cutting-edge global trends within the realm of mechanical design, stimulate scholarly discourse, facilitate the exchange of the latest research findings, anticipate future developmental trajectories, and foster the growth and amalgamation of disciplines related to mechanical design, 2023 International Conference on Mechanical Design (ICMD2023) and the 22nd Annual Conference on Mechanical Design have been jointly held on October 20–22, Chengdu, Sichuan, P.R. China.

The theme of the conference is “Innovative Design Drives High-Quality Development”. It is jointly organized by the Mechanical Design Institution of Chinese Mechanical Engineering Society and University of Electronic Science and Technology of China. The co-organizers of this event include Southwest Jiaotong University, Sichuan University, China Machine Press, Southwest Petroleum University, Chengdu University of Technology, Sichuan University of Science and Engineering, Southwest University of Science and Technology, Xihua University, Chengdu University, National Demonstration Center for Mechatronics and Control Engineering Education, and Key Laboratory of Oil and Gas Equipment, Ministry of Education. It is also sponsored by *Journal of Mechanical Engineering*, *Journal of Machine Design*, *Chinese Journal of Engineering Design*, and Springer.

About 175 papers among over 650 submissions have been selected and included in this book. The conference program includes 9 keynote speeches from world-renowned scholars and 31 oral sessions with six research topics, including Product Innovation Design, Multidisciplinary Simulation and Optimization Design, Reliability and Quality Assurance Design, Digital and Intelligent Design, Mechanism and Robot Design, Industrial Software, and Major Equipment Integrated Design.

It offers great opportunities for exchanging academic ideas and reinforcing professional networking.

We are grateful for the voluntary assistance provided by members of the Program Committee, the Organizing Committee, and the Conference Secretariat. Support from organizers and sponsors is also greatly appreciated. Additionally, we would like to thank the contribution from the reviewers, session organizers, and chairs. Our appreciation also goes to colleagues who promote this conference through their professional networks. We look forward to your attending the future events.



Prof. Jianrong Tan
Book Editor
Conference Chair
Hangzhou, China



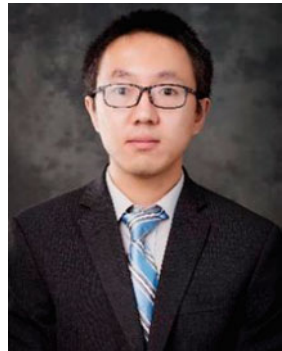
Prof. Yu Liu
Book Editor
Organizing Committee
Executive Chair
Chengdu, China



Prof. Hong-Zhong Huang
Book Editor
Conference Co-chair
Chengdu, China



Prof. Jingjun Yu
Book Editor
Beijing, China



Prof. Zequn Wang
Book Editor
Chengdu, China

Contents

Product Innovation Design

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Research on Multi-feature Fusion 3D CAD Retrieval Technology Based on Model Segmentation | 3 |
| Mingyu Duan and Bo Yang | |
| Design and Analysis of Automatic Tightening Device for Non-standard Screw Connection | 13 |
| Minggang Xu, Zhen Wang, Shengzhi Guan, and Zuhuang Liu | |
| Study of Influence Factors for Disruptive Innovation in Equipment Manufacturing Enterprises | 29 |
| Xiaoxuan Guo, Wang Sun, Qinglin Shi, and Rui Mu | |
| Inverse Seeking Method to Find the Force of the Variable Span Outrigger of Truck Crane Based on Analytic Method and Its Algorithm Realization | 47 |
| Zhengyan Chang, Zhengwei Zhang, Mingliang Yang, Qiang Deng, and Jinwei Wu | |
| Approach of Adaptive Change for Open Architecture Product Based on Axiomatic Design | 63 |
| Xiangfu Cheng, Yifei Pan, Zhihong Zhang, and Chenghui Wang | |
| Research on the Innovative Design of TRIZ Patent Circumvention Based on Basic-Elements | 79 |
| Lin Huajian, Feng Tielin, Jiang Fan, Huang Junhong, and Xie Baoshan | |
| Design and Load Capacity Research of a Novel Roller-Plate CVT | 99 |
| Lin Liu, Guoxing Sun, Liang Xu, and Zhangdong Sun | |
| Design Knowledge Graph and User Profiling-Driven Product Innovation Design Problem Solving | 117 |
| Zhinan Li, Guodong Sa, Zhenyu Liu, Chan Qiu, and Jianrong Tan | |

A Knowledge Graph-Driven Approach for Architecture Design Space Generation and Reduction 129
Yanshao Sun, Ru Wang, Yu Huang, and Zhendong Liu

Research on the Innovation Process Modeling for the Integration of DCC and Function Trimming 145
Hailiang Chen, Hongxiang Wang, Zifan Ma, Peng Zhang, Chuankai Zhang, Lu Liu, and Yunlong Che

An Analysis Method to Identify the Importance of Technical Parameters for Complex Products 167
Wang Sun, Jinhao Chen, Xiaoxuan Guo, Chengxiang Zhu, Yancheng You, and Rui Mu

Inter-generational Aging Design of Community Fitness Space and Equipment 193
Wen Yan, Cheng-xin He, Yan-min Xue, and Xin-ru Ye

Optimization Method for the Propagation Path of Complex Product Design Change Based on Reinforcement Learning 207
Zhuqin Wei, Haokun Li, Guannan Li, and Ru Wang

Intelligent Cognitive Artistic Style Recognition Model for Mechanical Design 219
Miao Zhou and Lan Jiang

Design Principle and Application for Automotive Wiring Corrugated Pipe Cutting Machine 233
Dan Liu and Zhanhui Yan

Design of Multi-task Scene Image Acquisition System in a Spacecraft Based on TRIZ 245
Shaofeng Tang, Shuchen Wan, Xiaosong Li, Guoyuan Ding, and Xin Qi

Design and Data Analysis of Muskmelon Sugar Content Detection System 259
Lintao Chen, Zhaoxiang Liu, Xiangwei Mou, Ying Lan, and Xinye Yu

A Human Digital Twin Based Framework for Human–Robot Hand-Over Task Intention Recognition 283
Ruirui Zhong, Bingtao Hu, Zhaoxi Hong, Zhifeng Zhang, Yixiong Feng, and Jianrong Tan

Design and Application of Data-Driven Visualization Platform for Dual Robotic Arms Assembly Process 297
Xiangrong Gong and Jianguo Duan

An Innovative Design Method with Good Operability and Practicality 319
Yuan Li and Kailiang Xiao

Product Requirements Mining and Innovative Design Based on Extension Theory Using Online Review Data 329
Jie Dong, Siyuan Cheng, Zhigang Yu, Xuerong Yang, and Manhui Huang

Research on a Novel Analogical Reasoning Method for Biomimetic Concept Generation 345
Jin Ma, Guoniu Zhu, Weiming Wang, Tongtong Zhang, Jie Hu, and Yinghong Peng

Low Load-Independent Losses and Low Temperature Rise Functional Cage Bearing 367
Chunhui Wei, Wei Wu, Tie Li, Daniel Nelias, and Shihua Yuan

Conceptual Design Method for Mechanical Products Based on Historical 3D Model Design Knowledge 377
Qibin Wang, Hanghang Zhang, Tao Chu, Xianguang Kong, Li Feng, Huan Cui, Bing Han, Chaojun Wang, and Liqiang Sun

Research on Aging-Friendly Design Evaluation Model of Wearable Devices Based on Implicit Interaction Theory 397
Yuzhe Jin, Jinmei Ou, and Tingting Zhang

Patent-Based Technology Efficacy Information Extraction in Product Innovation Design 419
Wanyue Hou, Ting Liu, Bo Li, Zeng Hong, and Wang Haiyang

Research on Forward Design for Product Innovation 429
Jianning Su, Hong Jia, Kai Qiu, and Wenjin Yang

Digital Twin-Driven Intelligent Monitoring of a Marine Gearbox Based on CNN-LSTM Network 447
Shuiguang Tong, Xianmiao Yang, Zheming Tong, and Yibo Jiang

Evaluation Index System of Human-Chair Adaptation of High-Speed Train Seat 459
Hao Anna, Li Yinxia, Hu Huimin, and Luo Ling

Design of Wearable KOA Postoperative Rehabilitation Training Equipment 469
Xiangning Wang, Wenzhou Lin, Jiaxin Zhao, and Yuchen Wei

Design Analogy by Functional Case Modeling and BioTRIZ in Biologically Inspired Design 485
Guo-Niu Zhu, Jin Ma, Jie Hu, and Zhongxue Gan

Multidisciplinary Simulation and Optimization Design

Study on the Effect of Support Stiffness on the Load-Sharing Characteristics of Star Gear Transmission 503
Jinfu Du and Hong Mao

Optimization Design of Dynamic Stiffness of Rolling Bearings for High-Speed Electric Spindles Using the Box-Behnken Response Surface Method 517
Xianming Wang, Xinyi Zhao, and Tianxiao Zhang

Optimization Design of Liquid Metal Lubricated Thrust Bearing in X-Ray Tube for High Speed Computed Tomography 539
Yazhen Wang, Mingqi Ou, Chenxu Bao, and Shiting Jiang

Characteristic Analysis of Pressure Pulsation Attenuation by Different Combinations of Inner Cannula 551
Zhi-jin Zhou, Xiao-feng Leng, and Ai-jun Liu

Multi-attribute Evaluation and Decision-Making for Configuration Design 561
Yang Wang, Wei Zeng, Zhenan Jin, and Guodong Yi

Improved Dynamic Path Planning Algorithm of Mobile Robot Based on Fusion of A* and DWA 569
Zhengyan Chang, Zhengwei Zhang, Mingliang Yang, and Chaobo Han

Topology Optimization of Electric Vehicle Chassis with Porous Frames and Feature-Deformable Batteries 585
Yufan Lu and Mingdong Zhou

Investigation of Variable Radius Base Circle Involute Control Coefficient for Scroll Compressor 603
Caisheng Hou, Yu Liu, and Jinhu Li

Aerodynamic Optimization of a Low Pressure Exhaust Hood of Steam Turbine Using Bayesian Optimization 615
Chao Bian, XiaoFang Wang, QingLong Liu, Xiao Tai, Rui Hu, and HaiTao Liu

A Surrogate Model Using Deep Learning for 2D Stress Distribution Prediction of Satellites 635
Jiaxiang Luo, Yu Li, Xianqi Chen, Weien Zhou, and Wen Yao

Design Optimization of Permanent Magnet Coupler Based on Physics-Informed Neural Networks 657
Bo Tan, Jin Yi, Yi Qin, Huayan Pu, and Jun Luo

Topology Optimization for the Lightweight Design of Mechanical Leg of the Hydraulic Bipedal Robot 671
Jiayi Zhu, Zhaohui Huang, Liang Gao, and Jie Gao

Study on Critical Parameters of Non-linear-stiffness Anti-galloping Device for Ultra-High-Voltage Transmission Line 685
Yongkun Zhu, Bin Zhao, Xin Shang, and Sihang Zhang

Adjustment Calculation Method for the Actuators of an Active Main Reflector Antenna 695
Yinwei Zhang, Ruiqi Jiang, Xue Han, Chenghui Pan, Wulin Zhao, Yuanpeng Zheng, Long Chen, Haibo Peng, Congsi Wang, and Peiyuan Lian

Kinetic Simulation Analysis of CT Spherical Tube Rotating Anode Rotor System 707
Bao Chenxu, Ou Mingqi, Li Qibing, and Wang Yifeng

Dynamic Adaptive Variable-Fidelity Modeling Method for BGA Solder Joint Design 723
Guannan Li, Jingdan Yu, Ru Wang, and Yan Yan

Scheme Optimization Method of Multi-station Modular Machine Tool Based on Non-cooperative Game 735
Wei Zeng, Xiaojian Liu, Yang Wang, Xudong Cui, and Guodong Yi

Multi-objective Optimization of the Front-End Structure of an Automobile Body Based on Active-Semi-Supervised Learning 749
Ming Chen, Aiguo Cheng, Chenglin Zhang, Shaowei Chen, Jisi Chen, and Yifei Huang

High-dimensional Bayesian Design Optimization Over Mixed Variables 773
Bingkun Guo, Xiaojian Liu, Yiming Zhang, Yang Wang, and Shuyou Zhang

Research on Indoor UAV 3D Path Planning Based on Optimal Ant Colony-Artificial Potential Field Method 795
Weidong Peng, Yifan Zhang, and Wei Guo

Prediction and Optimization of Residual Stress After Reflow Soldering of BGA Solder Joints Based on Multi-fidelity Surrogate Model 815
Chulei Zhang, Ru Wang, Zixiang Hu, Wenzhi Wu, Jingdan Yu, and Yan Yan

Research on Aerodynamic Characteristics of Ducted Fan System Under Wall Effect 835
Xuejie Chen, Meili Song, Yong Liu, Haonan Ouyang, Yanting Yu, Hongbo Wu, and Zheng Cheng

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| A Preliminary Demonstration of a Control Co-design Framework for the Floating Offshore Wind Turbines | 851 |
| Xianping Du, Zhe Feng, and Peng Xie | |
| Effect of Tip Clearance on the Cavitation Performance of a Helical Blade Transfer Pump | 871 |
| Xiaobing Huang | |
| Strength Analysis of AGV Chassis Based on Dynamic Load Spectrum of Hazardous Conditions | 893 |
| Shiji Zhou, Hong Wang, Wenjie Chen, Wenjing Wu, Yalei Feng, and Pengfei Wang | |
| Multi-objective Optimization Design of High-Speed Centrifugal Pump Impeller Based on NSGA-III Algorithm | 905 |
| Dongmei Song, Xueyin Liu, Lintao Zhong, and Mengwei Zeng | |
| A Parallel Multi-objective Efficient Global Optimization Method and Its Application of Multi-stage Axial-Flow Compressor Optimization Design | 917 |
| Youwei He, Chunming Fu, and Jinliang Luo | |
| Optimization Design of Helical Cylindrical Gears | 943 |
| Zhang Guogeng, Song Xiaowen, and Dong Suzhen | |
| Similarity Characteristics Research on Large Scale Con-Centrator Unit Considering Thickness Distortion | 957 |
| Yingchun Du, Guanheng Fan, Yiqun Zhang, and Dongxu Wang | |
| Numerical Simulation of Fatigue Crack Propagation in Nuclear Fuel Cladding Tube | 973 |
| Xuwen Gan, Linghong Shu, and Yunqiao Dong | |
| Numerical Simulation Analysis of Finger Seal Wear Performance | 987 |
| Xubo Li, Pengpeng Li, Hua Su, and Pingping Hu | |
| Structural Design of a Kirigami Gripper by Finite Element Method | 1009 |
| Bohan Yang, Jian Wu, and Zhe Li | |
| Simulation Analysis of the Oil Distribution and Churning Loss of a Planetary Gear Train in Splash Lubrication | 1019 |
| Huixiao Chen, Lubing Shi, Yibo Sun, Bang Pei, and Zhongming Liu | |
| Multi-objective Optimization Design on Squamous Texture for the Sealing Performance | 1035 |
| Na Zhang, Yancong Liu, and Changfeng Fan | |
| Research on Reversing Impact Control Based on Parallel Large Inerter Suspension | 1045 |
| Yan Xiong, Jifu Guan, Zhendong Liu, Li Cao, and Ruixia Zhai | |

Topology Optimization Design of Cartwheel Hinge Based on Response Surface Method 1061
 Jianfeng Chen, Xuefei Chen, Xiaoxiao Chen, Xiaobing Li, and Yichuan Dai

Topology Optimization of Multi-material Structures Based on Improved BESO Algorithm 1075
 Gang He, Yang Zhou, Zhaoyuan Cao, and Hu Yang

Research on the Dynamic Characteristics of Hot Die Forging Press Controlled by Combined Wet Clutch-Brake 1091
 Lingqing Zhang, Hongwei Cui, Bizhou Mei, Donghui Li, Long Cui, and Qi Li

Implementation of Hydro-thermal Coupling Model of Windshield Defrosting System in OpenFOAM 1109
 Ming Li, Haijun Xu, Shangyi Zhao, Ping Zou, and Jing Wang

Research on Cauchy Mutation Grasshopper Optimization Algorithm-Based PID Control of the Dual-Drive Feed System 1121
 Tao Jiang, Hong Lu, Qi Liu, Cong Xiao, Bin Liu, Jiji He, Min Hu, and Ben Wang

A Vibration Suppression Control Strategy Based on Grey Wolf Optimization Algorithm 1143
 XuJie Yuan, Hong Lu, Yongquan Zhang, Zhimin Chen, Zidong Wu, Taotao Zhou, He Huang, Hao Fu, and Dingzhong Li

Influence of Rocker Pin Elastic Deformation on the Dynamic Characteristics of Chain CVT 1161
 Bing Fu, Yuguai Lei, Jingang Liu, Xionghai Rao, and Sisi Liu

Surrogate-Assisted Hybrid Searching Method for High-Dimensional Expensive Optimization Problems 1179
 Nannan Gao, Renhe Shi, Xinhui Tai, and Nianhui Ye

Thermo-Structural Coupling Analysis and Verification of Antenna Deployment Hinges 1193
 Hui Qiu, Chunyu Yu, Haowei Wang, Dong Liu, and Bingyan Li

Topology Optimization of the 3D Heat Dissipation Structure via the Improved Feature-Driven Method 1203
 Qianqian Zhang, Shouyu Cai, Yuxin Sun, and Lan Zhang

Analysis of Friction and Lubrication Characteristics of Tapered Roller Bearings Under Thermal Elastohydrodynamic Lubrication 1215
 Tao Yu, Wenhao Shen, Chunhui Xu, and Quanzhong Liu

Floating Projection Topology Optimization of Functionally Graded Porous Infill Structures for Acoustic-Mechanical Coupled Systems 1227
 Jie Hu, Jiao Xu, Jiachun Li, and Xiaodong Huang

Reliability and Quality Assurance Design

Reliability Analysis of Battery Electric Vehicle High-Speed Gear Transmission Considering Correlation of Multiple Failure Modes 1253
 Jinfu Du, Nanfei Qu, and Pan Yang

Optimization of Design Change Propagation Path for Mechanical Product Considering Component Complexity 1265
 Xianfu Cheng, Lizhi Xu, Zhihu Guo, and Mingtao Liu

Experimental Study on Fretting Wear Mechanism of Conductor-Fitting System in Distribution Net 1283
 Feng Yu, Wu Shaolei, Wu Kai, Wang Jinye, Cai Meng, and Wang Wei

Reliability Analysis of Wind Turbine Blades Based on Numerical Analysis and Multi-fault Competition Failure 1293
 Xin-Yu Ge, Jun-Xi Bi, Hang Ma, Yan Wang, Jia-Ming Jiao, and Guo-Fu Wang

Failure Model and Multi-parameter Leakage Rate Analysis of Metal Rubber Seals 1313
 Hui Yan, Ji yuan Yin, Shuofu Liu, Zhaobo Chen, and Tianyi Jiang

Construction of Fatigue Life Prediction Model and Optimization of Structural Parameters for Gear-Rack Transmission Mechanism of Mountain Train 1327
 Fan Li, Zhou Li, Fuyuan Liu, Shisong Wang, and Xingqiao Deng

Uncertainty Propagation Analysis of TBM Performance Based on Sparse Polynomial Chaos Expansion Combined with Kernel Density Estimation and Bayesian Model Average 1345
 Yue Li, Jiazhi Miao, Hao Liu, and Gongbo Zhou

The Dual-Encoder Transformer for Prediction of Aero-Engine Remaining Useful Life with Uncertainty Quantification 1357
 Feifan Xiang, Yiming Zhang, and Shuyou Zhang

Probabilistic Diagnosis of Aviation Engine with Invertible Neural Network 1369
 Zhiwei Pan, Yiming Zhang, Xiaojian Liu, Yang Wang, and Shuyou Zhang

Multi-agent Deep Q-Learning for Maintenance Scheduling of Engineering System with Large-Scale State Space 1383
 Dingyang Zhang, Yiming Zhang, and Shuyou Zhang

An Improved Wavelet Filtering Method for Welding Seam Images in a Complex Environment 1393
 Jie Deng and Wenzhi Zhang

Study on the Method to Predict the Fatigue Life of a Rubber Mount 1409
 Qian Li, Gang He, Jia Zhao, and Ming-hai Yuan

Study on Wear Characteristics of the Rack-and-Pinion Driving Mechanism in the Rack Railway Under Mixed Elastohydrodynamic Lubrication 1423
 Liyuan Zeng, Jinming Luo, Fengyuan Liu, Shisong Wang, and Xingqiao Deng

Improved PMSM Speed Control Strategy with Non-singular Fast Terminal Sliding Mode Control Based on Real-Time Simulation 1437
 Yuchao Wang, Shiji Liu, Yuping Yang, Song Li, and Lijia Xu

Motion Reliability Analysis of 6-DOF Industrial Robot 1457
 Ding Li and Li Ziyi

Review on Intelligent Fault Diagnosis of Wind Tunnel Test System 1475
 Gengwei Yan

Prediction of Water Demand in Pump Station Based on GM(1,1)-MA Model 1497
 Dongmei Song, Xueyin Liu, Yi Yan, and Shuai Jiang

Typical Faults Recognizing for Seal Rings of Hydro-Dynamic Shaft Seal of Reactor Coolant Pump Based on ANN and Experimental Research 1509
 Quan-chao Yang, Xue Wen, Xiang Zhao, and Liu Ying

High-Reliable Design for Mechanical Environment Adaptability of Space Servo Mechanism 1523
 Yang Jiao, Yinghong Wang, Shuang Yu, Yue Yang, and Jinping Yang

Research on Fatigue Crack Propagation and Life Prediction Based on GRU Neural Network 1537
 Hong Lu, Guangao Yang, Zhimin Chen, Yongquan Zhang, Chenyang Fu, He Huang, Xujie Yuan, and Zhangjie Li

Failure Analysis and Shape Optimization of Bonding Wire for SiC Power Module Encapsulated with Epoxy Resin 1559
 Sanli Liu, Min Chen, Nan Zhu, Zhouyi Xiang, and Shunqi Zhang

Numerical Simulation and Experimental Investigation on the Thin-Walled Lenticular Deployable Composite Boom During Coiling Process 1575
Taotao Zhang

Optimized Design of Tribological Properties of Nano WS₂ Lubricants Based on Ionic Liquid Additives 1589
Yucong Qian, Shuai Jiang, Yong Zhang, and Heng Guo

A Study on the Application of Industrial Collaborative Design Based on Agent Technology 1607
Haiping Wang and Lihui Yan

Copula-Based Efficient Estimation for Global Reliability Sensitivity Analysis 1615
Liangli He, Xinfa Chen, and Xinyao Li

A Sequential Interval Optimization Method for Tolerance Design 1631
Jiachang Tang, Taolin Zhang, Yong Lei, Xiao Li, Pengsheng Zhou, Junhao Gong, Yongsheng Yi, Lei Liu, Yucheng Cao, and Lina Zhan

Digital and Intelligent Design

Optimal Design of Contact Interface Material Hardness for Improving Thermal Contact Performance 1653
Chen Wang, Qiyin Lin, Jun Hong, Zongkun Pan, and Xianyang Li

PSO-Based Optimization of Rolling Contact Interface Modification of Cylindrical Roller Bearing 1667
Heng Shao, Qiyin Lin, Jun Hong, Chen Wang, and Xianyang Li

A Text Matching Model Based on Keyword Attention Mechanism for Electronic Information Domain 1683
Bizhen Bao, Shaoliang Yang, Weigang Xu, and Weizhi Liao

A Method for Constructing Processes of Complex Parts with Multiple Features 1693
Xuewei Zhang, Yang Wang, Xudong Cui, and Xiaojian Liu

Fine-Grained Entity Classification Technology for Data Standard Adaptation 1711
Weizhi Liao, Zhengyan Liang, and Dejin Yan

Intelligent Collaborative Innovative Design Method Under Open Environment 1721
Shipei Li, Niu Ruixia, Qi Wang, and Tingjun Wang

Spatial Data Thickening-Based Carbon Nephogram Using UAV Real-Time Monitoring 1735
Zhiqi Nie and Bin He

Research on Complex Product Maintainability Configuration Design Method Based on Knowledge Graph 1755
 Yuebin Dai, Rong Li, Haizhu Zhang, Xu He, and Zhi Gao

Research on Multi-Agent Requirements Uncertainty of Complex Product Based on S-Cloud Model 1773
 Huanhuan Mei, Rong Li, Haizhu Zhang, Fuwei Wu, and Jiajun Liu

Cognition Behavior Modeling of Geometrical Entities for Autonomous Assembly Path Planning 1789
 Haoyang Zhu and Zhijia Xu

Optimal Design of Material Stiffness Based on WMFOA for Regulating Dynamic Performance of Contacting Structure 1805
 Xianyang Li, Qiyin Lin, Yicong Zhou, Zongkun Pan, Chen Wang, and Jun Hong

Optimization Design Method of Interference Fit Amount for Assembly Interface Contact Performance 1819
 Kaiyi Zhou, Qiyin Lin, Yicong Zhou, Chen Wang, and Jun Hong

A WOA-Stacking Grading Mode Based on Multi-heterogeneous Classifiers Ensemble 1831
 Kaihu Hou, Jin Zhang, Jie Long, Xiaolei Gai, Xiaowei Zhang, Yuchen Liu, Jiwu Zhang, Haowei Sun, and Ke Zhang

Knowledge Reuse Method of Configuration Design Based on Knowledge Graph Embedding 1855
 Liuwen Zhang, Rong Li, Haizhu Zhang, Guofu Ding, and Fuwei Wu

Delamination Damage Mechanism of CFRP Laminates During the Interference-Fit Bolt Assembly Process 1871
 Danlong Song, Keyi Hua, Yuanhao Wang, Zhenchao Yang, and Zhenyi Yuan

Research on State Prediction of Wind Turbine Gearbox Based on Monitoring Data Distribution Similarity and Feature-Based Transfer Learning 1881
 Yongchao Zhu, Caichao Zhu, Yong Tan, Jianjun Tan, and Ye Zhou

Construction of a Cost Design and Control System Based on MBSE 1895
 Hong-yi Zhang, Yu Xia, Yu-shan Xu, and Hao Guo

Improving Communication Efficiency in Federated Learning via Metaheuristic-Based Learning Algorithms 1911
 Rongshen Lai and Xiuyu Pu

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------|------|
| A Novel Approach for Quantifying the Wrinkling Degree of Cured Tobacco Using Unsupervised Depth Estimation | 1923 |
| Kaihu Hou, Shuqi Shi, Jinshu Gao, Jie Long, Xiaolei Gai, Xiaowei Zhang, Yuchen Liu, Jiwu Zhang, Haowei Sun, and Ke Zhang | |
| Integrated Assembly and Disassembly Sequence Planning for Multifunctional Complex Products | 1939 |
| Xuewei Zhang, Yang Wang, Guodong Yi, Lemiao Qiu, and Shuyou Zhang | |
| A High-End Equipment Real-Time Virtual-Real Interaction Implementation Based on Digital Twin | 1949 |
| Jianhao Fang, Weifei Hu, Jinjun Liao, Tongzhou Zhang, Kai Wang, Zhenyu Liu, Yongsheng Wang, and Jianrong Tan | |
| Mechanism and Robot Design | |
| An Approach for Analysing the Coupling Effects Between Dynamics and Tooth Surface Wear in a Helical Gear Transmission System | 1975 |
| Lixin Xu, Yuan Shi, Zhengzhu Du, and Shuzhi Deng | |
| Research on the Motion Accuracy Reliability of Rigid-Flexible Coupling Mechanism with Lubrication Clearances | 2007 |
| Shun Gao, Shouwen Fan, and Hongjia Zhang | |
| Influence of Tooth Surface Friction on Dynamic Meshing Characteristics of Elliptic Gears | 2027 |
| Changbin Dong, Longkun Li, and Yongping Liu | |
| A Novel Airbag Aided Differential-Drive Capsule Robot Towards Colonoscopy | 2041 |
| Jianlin Yang, Zhijun Sun, Feng Qian, Qing Lu, and Yu Guo | |
| Path Planning of Mobile Robot Based on Bresen-Ham Line Algorithm Improved A* Algorithm | 2055 |
| Shiqi Wang, Jiawen Li, Yangqing He, and Niuniu Gen | |
| Design and Analysis of a Reconfigurable Joint | 2067 |
| Haihong Li, Jinan Dong, and Bin Zhang | |
| Study on Mechanism Design and Posture Control of a Wheel-Legged Vehicle | 2085 |
| Xiaolei Ren, Hui Liu, Jiaoyang Xia, Weihe Hao, Qingyi Shang, and Qian Chen | |
| Supportless Cylindrical Printing of Rotating Components with Overhangs on a Rotary FDM 3D Printer | 2099 |
| Donghua Zhao, Kaicheng Ruan, Guoquan Zhang, Yaohui Wang, Ziwen Chen, Xinmeng Zha, Ke Dong, and Yi Xiong | |

Visual Relocalization Optimization of Mobile Robot via Combining AprilTag with ORBSLAM3 2119
 Mingyuan Wu, Shuting Wang, Hu Li, and Yuanlong Xie

LQR Optimal Composite Control for Mobile Robot Trajectory Tracking System Based on LPV Model 2135
 Sai Zhang, Yuanlong Xie, Shuting Wang, and Hu Li

Leg Parameters Optimization of Wheel-Legged Vehicle Based on Trot Gait 2153
 Jingshuo Xie, Lijin Han, Hui Liu, Shida Nie, Xuanhu Zhao, Xiaolei Ren, and Qingyi Shang

Mechanism Design of a Self-submersible Planetary Drilling and Sampling Robot 2165
 Riyue Wu, Wei Wang, Jiabin Liu, Zeng Zhao, Jiawei Dong, Zhiwei Long, Lin Zhong, Jinchang Xu, Peineng Zhong, Jian Li, Kun Xu, and Tao Zhang

Free Vibration Analysis of Rotating Functionally Graded Joined Cylindrical-Conical-Cylindrical Shells with Arbitrary Boundary Conditions 2179
 Lei Pang, Wenguang Liu, Long Cheng, and Zheng Huang

Dynamics Characteristics Analysis of Rack Railway Guiding Equipment of Mountain Rack Railway Train with Considering Wheel-Rail Contact 2193
 Haowen Wang, Quanming Xiang, Weiping Liu, Chang Gao, Jialin Liu, Shisong Wang, and Xingqiao Deng

A Closed-Chain Ship Welding Robot: Design, Singularity and Dexterity 2211
 Yuchen Pan, Minghang Yue, Yufu Li, Zhengqiang Guo, and Hongzhou Wang

Effects of Bluff Body Cross-Section on the Electrical Response of a Piezoelectric Energy Harvester Under Hybrid Excitation 2227
 Sipeng He, Wenguang Liu, Long Cheng, and Mingyang Gao

Kinematics Analysis of Vehicle-Parallel Manipulator System Based on Delta Robot 2243
 Zhihao Xu, Zongyu Chang, Jun Zhong, and Haibo Wang

Integrated Error Modeling and Experimental Verification of 2UPR&2RPS-XY Type Five-Axis Hybrid Machine Tool 2251
 Chengyang Wu, Zhen He, Zaichao Sun, Kailong Wang, and Jun Zhang

Dexterity Analysis of an Colonoscopy Surgical Manipulator Combined with Spherical Joint and Cable-Driven Mechanism 2263
 Yuantian Gao and Yuan Chen

Dynamics Modeling and Analysis of a 3T1R Four-Degree-of-Freedom Parallel Robot with Full-Circle Rotation Capability 2279
 Guohui Liu, Zhihao Li, Quanguo Lu, Fangzhi Gui, and Hongtao Yu

Unmanned Roller Based on Visual SLAM 2295
 Peng Tan, Yongbiao Hu, Hao Huang, Bin Li, and Ruwei Zhang

Design and Analysis of Rigid Continuous Deformation Mechanism Based on Heterogeneous Unit 2307
 Weiming Guo, Hong Xiao, Hongwei Guo, Jianguo Tao, and Rongqiang Liu

Design and Analysis of a Novel Soft Pneumatic Actuator with Bidirectional Adjustable Bending Function 2323
 Jie Liu, Chenxu Yan, Xiaolong Hao, Qiang Cheng, Yi Wang, and Jingjing Xu

Kinematics and Performance Analysis of a Hybrid Mechanism with Reconfigurability 2339
 Litao He, Hairong Fang, and Dan Zhang

Design and Prototype Verification of Multi-fold Rib Deployable Antenna Mechanism 2357
 Dake Tian, Yifan Zhang, Lu Jin, Haiming Gao, Shen Yang, Hongqiang Lei, and Xihe Cui

Rigid-Flexible Coupling Dynamics Analysis of Multi-output Transient Deployment Mechanism Based on ANCF 2369
 Guangqing Zhai, Hong Xiao, Guang Yang, Hongwei Guo, Jianguo Tao, and Rongqiang Liu

Traveling Wave Modal Frequency Analysis of Rotating Functional Gradient Carbon Nanotubes Conical Shells 2389
 RunHao Wan, WenGuang Liu, Long Cheng, and Zheng Huang

Design of Sliding Mode Tracking Control System for Radiograph Shooting Robot Based on Camera Vision Center Position 2405
 Xiaolong Hao, Zhaojun Jin, Qiang Cheng, Yunsong Liu, Shuai Zhao, and Yi Wang

Research on the Identification Method of Colour-Based Status Indicator Based on Feature Matching 2421
 Guixin Zhang, Yi Wan, Jiarui Hou, Yanan Li, and Jianwei Li

Driving-Stepping Locomotion Control for Wheel-Legged Robots 2429
 Dengting Liao, Hui Liu, Baoshuai Liu, Yifan Zhang, and Lijin Han

Multi-objective Trajectory Optimization of 6-DOF Manipulator Based on Improved NSGA-II Algorithm 2451
 Shunjing Hu, Yi Wan, Xichang Liang, Jiarui Hou, and Shilei Zhang

Design of Dynamic Grasping Vision Servo System Based on Pyramid Optimization Interception Algorithm 2467
 Shuai Jiang, Yucong Qian, Heng Guo, and Yong Zhang

A Hybrid Algorithm for Dynamic Path Planning of Mobile Robot Using Improved A* and DWA 2483
 Zheng Zhou, Min Chen, Yiwen Wang, Songhua Huang, and Eng Gee Lim

Motion/Force Transmissibility of a 5-DOF Parallel Driving Mechanism 2505
 Jinzhu Zhang, Hanqing Shi, Tao Wang, and Qingxue Huang

Design of Automatic Control System for the Laying of Waterproof Plate in Tunnel Construction 2517
 Guangda Lu, Xu Han, Zhuangzhuang Zhao, Tinghang Guo, Yu Han, and Xiang Li

Dimension Design of a Novel Multi-morphology Transformable Mobile Robot 2525
 Yinghan Peng, Weixing Chen, and Feng Gao

An FBG-Based Clamping Force Sensor for Intervertebral Foraminoscopic Surgery 2557
 Tianliang Li, Guanyi Wang, Xue Han, and Yuegang Tan

Industrial Software and Major Equipment Integrated Design

The Management System of the Whole Cycle Supply Chain of Large Aircraft Based on Collaborative Development 2571
 Xiao Cui, Pinggui Zhang, Peng Fan, and Jianzhong Chai

Theoretical Analysis of the Bearing Faults Impact on Large Aperture Antenna Pointing Accuracy 2583
 Chenghui Pan, Song Xue, Jianlun Huang, Zheng Jin, Peiyuan Lian, Bo Lu, Haibo Peng, Qian Xu, and Congsi Wang

Design and Fabrication of an SOI Optical Switch with Backside Release for Anti-high-Overload 2605
 Jin Xie, Zhenhua Liu, Xiao Zhang, Jun Cao, Jun Dai, and Chao Zeng

Analysis of Electromagnetic Wave Propagation Characteristics in Building Walls 2615
 Yan Wang, Gang Wang, Yiwan Mao, Qinglei Qiu, Zhongxing Duan, Zongfang Ma, Longyang Wang, Baoqing Han, and Congsi Wang

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Modeling and Simulation of Nonlinear Dynamics for Coupled Motor-Reducer Systems Based on Bond Graph | 2629 |
| Qingqing Chen, Rui Xu, Zihui Wang, Jiabao Pan, Wei Huang, Jing Zhang, and Jiugen Wang | |
| Design and Experiments of a Regolith Environment Simulator for Lunar Polar Region Exploration | 2647 |
| Peineng Zhong, Jinchang Xu, Lusi Wang, Zeng Zhao, Qichen Sun, Ting Zeng, Haotian Wang, Jiabin Liu, Riyue Wu, Jiawei Dong, Kun Xu, and Tao Zhang | |
| Visualized Performance Evaluation of 3D CAD Software Based on Hierarchical Clustering Considering the Uncertainties in Insufficient Test Data | 2659 |
| Jin Cheng, Huqiang Ye, Deshang Peng, and Zhenyu Liu | |
| Visualized Performance Evaluation of 3D CAD Software Based on Rich Test Data and Radial Clustering Considering Credibility | 2671 |
| Jin Cheng, Huqiang Ye, Jianrong Tan, and Deshang Peng | |
| Development of Ultra-Precision Large-Stroke OLED Inkjet Printing Equipment | 2683 |
| Qi Li, Chuanyan Zhou, Donghao Cao, Guanming Wang, Zhi Zhou, and Shuhui Wang | |
| Development of Fast Installation System for Large Scale Model of FL-10 Wind Tunnel | 2701 |
| Weiqiang Mu, Tianshuang Shao, and Jianfeng Wang | |
| Study on Influences of Interference-Fit Assembly on Dynamic Characteristics of a 10 MW Planetary Gear Train with Flexible Pins | 2717 |
| Hao Li, Jianjun Tan, Shuyi Yang, Caichao Zhu, and Zhangdong Sun | |
| Fast Prediction of Structural Stress Field Using Point Cloud Deep Learning | 2741 |
| Han Yang, Bomin Wang, Jianhui Wu, Mengying Ma, and Fenfen Xiong | |
| Research on Synchronization Control Strategy of Dual Drive Feed System by Using Single Neuron PID | 2757 |
| Jiji He, Hong Lu, Zhimin Chen, Zhangjie Li, Qi Liu, Yuan Xia, Min Hu, and Zhanyun Deng | |

Product Innovation Design