



Lecture Notes in Mechanical Engineering

Xiaoting Rui  
Caishan Liu *Editors*

# Proceedings of the 2nd International Conference on Mechanical System Dynamics


ICMSD2023

 Springer

# Lecture Notes in Mechanical Engineering

## Series Editors


Fakher Chaari, National School of Engineers, University of Sfax, Sfax, Tunisia

Francesco Gherardini , Dipartimento di Ingegneria “Enzo Ferrari”, Università di Modena e Reggio Emilia, Modena, Italy

Vitalii Ivanov, Department of Manufacturing Engineering, Machines and Tools, Sumy State University, Sumy, Ukraine

Mohamed Haddar, National School of Engineers of Sfax (ENIS), Sfax, Tunisia

## Editorial Board

Francisco Cavas-Martínez , Departamento de Estructuras, Construcción y Expresión Gráfica Universidad Politécnica de Cartagena, Cartagena, Murcia, Spain

Francesca di Mare, Institute of Energy Technology, Ruhr-Universität Bochum, Bochum, Nordrhein-Westfalen, Germany

Young W. Kwon, Department of Manufacturing Engineering and Aerospace Engineering, Graduate School of Engineering and Applied Science, Monterey, CA, USA

Justyna Trojanowska, Poznan University of Technology, Poznan, Poland

Jinyang Xu, School of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai, China

**Lecture Notes in Mechanical Engineering (LNME)** publishes the latest developments in Mechanical Engineering—quickly, informally and with high quality. Original research or contributions reported in proceedings and post-proceedings represents the core of LNME. Volumes published in LNME embrace all aspects, subfields and new challenges of mechanical engineering.

To submit a proposal or request further information, please contact the Springer Editor of your location:

**Europe, USA, Africa:** Leontina Di Cecco at [Leontina.dicecco@springer.com](mailto:Leontina.dicecco@springer.com)

**China:** Ella Zhang at [ella.zhang@springer.com](mailto:ella.zhang@springer.com)

**India:** Priya Vyas at [priya.vyas@springer.com](mailto:priya.vyas@springer.com)

**Rest of Asia, Australia, New Zealand:** Swati Meherishi at [swati.meherishi@springer.com](mailto:swati.meherishi@springer.com)

Topics in the series include:

- Engineering Design
- Machinery and Machine Elements
- Mechanical Structures and Stress Analysis
- Automotive Engineering
- Engine Technology
- Aerospace Technology and Astronautics
- Nanotechnology and Microengineering
- Control, Robotics, Mechatronics
- MEMS
- Theoretical and Applied Mechanics
- Dynamical Systems, Control
- Fluid Mechanics
- Engineering Thermodynamics, Heat and Mass Transfer
- Manufacturing Engineering and Smart Manufacturing
- Precision Engineering, Instrumentation, Measurement
- Materials Engineering
- Tribology and Surface Technology

**Indexed by SCOPUS, EI Compendex, and INSPEC.**

All books published in the series are evaluated by Web of Science for the Conference Proceedings Citation Index (CPCI).

To submit a proposal for a monograph, please check our Springer Tracts in Mechanical Engineering at <https://link.springer.com/bookseries/11693>.

Xiaoting Rui · Caishan Liu  
Editors

# Proceedings of the 2nd International Conference on Mechanical System Dynamics

ICMSD2023

 Springer

*Editors*

Xiaoting Rui  
Institute of Launch Dynamics  
Nanjing University of Science  
and Technology  
Nanjing, China

Caishan Liu  
College of Engineering  
Peking University  
Beijing, China

ISSN 2195-4356

ISSN 2195-4364 (electronic)

Lecture Notes in Mechanical Engineering

ISBN 978-981-99-8047-5

ISBN 978-981-99-8048-2 (eBook)

<https://doi.org/10.1007/978-981-99-8048-2>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 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.

# Contents

<b>Multibody System and Mechanism Dynamics</b>	
<b>Multi-objective Optimization of the Tether-Net Deployment Stage</b> .....	3
Jiyue Si, Shan Xue, Guangzhi Cui, Jun Ma, Fang He, and Xiaochen Bai	
<b>Research on Modeling and Simulation of Opening and Limiting Mechanism Based on Motion and CATIA</b> .....	21
Ying Xu, Wenjing Zhi, Weijuan Zheng, Qian Zhang, Haitao Liu, and Dongping Liu	
<b>Study on Dynamic Analysis Method of Emergency Door Opening Process</b> .....	37
Weijuan Zheng, Hongjun Pang, Wenjing Zhi, and Ying Xu	
<b>Research on Dynamics of Planar Multi-body Systems with Clearance Joint Based on an Improved Nonlinear Contact Force Model</b> .....	47
Zhimin Wang, Guoguang Jin, Boyan Chang, Dong liang, Zhan Wei, Bo Li, and Yang Zhou	
<b>Micro-vibration Analysis of a Satellite on Orbit by Using a Flexible Multibody Dynamic Model</b> .....	69
Zhengzheng Cai, Jialiang Sun, and Dongping Jin	
<b>Deployment Dynamics of a Space Thin Shell Structure and Its Application</b> .....	85
Chenglei Tang, Chunhua Zhou, Jialiang Sun, and Weidong Chen	
<b>Theoretical and Simulation Analysis of Pilot-Operated Relief Valve Characteristics Based on AMESim</b> .....	105
Junrui Huang, Xue Zhao, and Wenyuan Ding	

<b>Optimization Design of Cam Drive System for Die-Cutting Machine Based on B-Sample</b> .....	117
Jian-Bo Sun and Rui-Ming Fang	
<b>Non-linear Dynamic Analysis of the Single-Pin Meshing Pair of Tracked Vehicles</b> .....	133
Yuchen Su, Chunlin Liu, and Hongrui Cao	
<b>Elastic Effect of Variable-Length Flexible Cables Axially Moving in Underwater Tunnel</b> .....	147
Jianming Wang, Qi Yang, Bolun Huang, and Xinquan Chen	
<b>Collision Dynamics Analysis and Optimization of Rolling Cantilever Sliding Mechanism</b> .....	167
Hongjun Pang and Weijuan Zheng	
<b>Wind Turbine Dynamic Response in an Offshore Wind Farm with Wake Effects</b> .....	177
Sheng Cen, Yingning Qiu, Mengfei Li, and Yanhui Feng	
<b>Methodology for Obtaining Contact Model Parameters of Projectile Barrel Coupled System: A Parameter Identification Approach</b> .....	191
Yuze Ma, Feifei Liu, Zhihui Si, Mingqin Xiong, and Peilong Ma	
<b>Dynamic Modeling of Flexible Bio-mimetic Robotic Fish Driven by MFC Based on the Absolute Nodal Coordinate Formulation</b> .....	203
Youcheng Xue, Liang Li, Dingguo Zhang, Xian Guo, and Yongbin Guo	
<b>Airdrop Landing Rocket Dynamics Simulation in Multiple Rocket Storage-Transportation Box</b> .....	221
Yutian Sun, Guoping Wang, Yu Zhang, Youyu Wang, and Lilin Gu	
<b>Kinematics Analysis of Multi-link Mechanisms Under the Interaction of Motion Pair Clearance and Elastic Links</b> .....	237
Juan Huang, Dang Zhou, Hongbing Wang, and Lairong Yin	
<b>Research on Missile Vibration Characteristics Considering Engine Vibration Based on Mstmm</b> .....	265
Yiwen Pu, Lilin Gu, Guoping Wang, Zhengquan Liu, and Jinxin Tang	
<b>Multibody Lubrication Dynamics of Mechanical Transmission System</b> .....	279
Liangwei Qiu and Xiaoyang Chen	
<b>Rigid-Flexible Coupling Dynamics Analysis of Cargo Door Opening Mechanism Based on ABAQUS and ADAMS</b> .....	305
Wenjing Zhi, Anting Chen, Weijuan Zheng, Chen Zhang, Dongping Liu, and Delong Dou	

**Dynamic Modelling and Analysis of Flexible Structure Actuated by Dielectric Elastomer** ..... 321  
 Yuqing Guo, Fanggui Li, Liang Li, Dingguo Zhang, and Xian Guo

**Design and Dynamics of a Cable-Driven Flexible Crawling Robot** ..... 337  
 Yicheng Wang, Weihua Zeng, and Jialiang Sun

**Dynamics Analysis of the Door of a Delivery System** ..... 355  
 Weijuan Zheng, Wenjing Zhi, Ying Xu, and Hongjun Pang

**Multibody Dynamics Simulation and Experimental Study on the Semi Feed Peanut Picking Mechanism** ..... 365  
 Bing Wang, Xiaolian Lv, and Zhichao Hu

**Cooperative Control for Rod-Shaped Payload Transportation with Two Quadrotors** ..... 387  
 Yankai Wang and Ti Chen

**Research on Static and Dynamic Behavior of a Radial Tire Under Different Load Magnitude** ..... 397  
 Ziyao Ma and Hanjing Lu

**A Digital Twin Model of Planetary Gearbox with Bearing Fault** ..... 417  
 Chaohu Wei, Yang Yang, Jianghai Shi, Minggang Du, and Hongrui Cao

**Numerical Study on the Influence of Geometric Parameters on the Hydrodynamic Performance of Cycloidal Propellers** ..... 431  
 Chuanzhi Duan, Qinghao Yan, Xusheng Li, Zhenxing Zhao, and Jian Hu

**Experimental Study of Low-Speed Over-Rotating Steel Ball Oblique Collision** ..... 447  
 Yanping Liu, Shucui Zhang, Xingang Zhang, and Wenli Yao

**Study on Vibration Characteristics and Mechanism of TBM Main Bearing Under Uneven Load** ..... 463  
 Ao Cao, Hongli Gao, Shuwei Fan, and Yalei Liu

**Dynamic Modelling of a Continuum Robot Arm with Five 3-DoF Segments** ..... 477  
 Isa B. I. Helal, Yixiong Du, Hao Wang, and Xuping Zhang

**Mechanism Reliability Analysis of Ammunition Conveyer Based on Deep Learning Neural Network** ..... 495  
 Haolin Zhang, Longmiao Chen, and Taisu Liu

**A Novel Dynamic Model of the Straight Beam Using the Rigid Body Element Method** ..... 509  
 Dong Wang, Hongrui Cao, Chao Yin, and Kaikai Liu



<b>An Equivalent Modeling Method for U-Shape Clamp Connectors</b> . . . . .	519
Shaowei Song, Dan Wu, Jian Liu, Longlei Dong, and Xiaoyi Wang	
<b>Modal Analysis and Experiments of an Inflatable Space Structure with a Moving Mass</b> . . . . .	535
Hao Du, Jialiang Sun, and Dongping Jin	
<b>Dynamic Response Characteristics of Rolling Bearing with Clearance Under Unstable Conditions</b> . . . . .	555
Junhua Zhang, Yong Zhou, Yu Chen, Chen Chen, Ling Wang, and Haoran Zhu	
<b>Computational Screw Dynamics of Multi-body-Systems</b> . . . . .	565
Jing-Shan Zhao, Xiao-Cheng Sun, and Song-Tao Wei	
<b>Study on Coupled Vibration of Armored Cable System Based on Traditional Finite Element Method</b> . . . . .	581
Zengjie Zhang and Naige Wang	
<b>A Semi-active Four-Bar Linkage Trunk Rehabilitation Device</b> . . . . .	591
Liang Zhang, Xuefeng Wang, and Nader Jalili	
<b>Screw Dynamics of a Bipedal Humanoid Robot</b> . . . . .	605
Han-Lin Sun, Dong-Jie Zhao, and Jing-Shan Zhao	
<b>Framework and System Models of an Intelligent Excavator</b> . . . . .	615
Lijing Hu, Qiang Peng, Dong Yuan, Jiafeng Zhang, and Bo Li	
<b>A Feature Fusion Method Based on DeepONet for Dynamic Equations</b> . . . . .	631
Yin Huang and Jieyu Ding	
<b>Dynamics Analysis and Optimization of a Simplified Axisymmetric Vectoring Nozzle Rigid Flexible Coupling Mechanical System with Clearance Joints</b> . . . . .	643
Haofeng Wang, Xiaoyu Wang, Chunyang Xu, Zhong Luo, and Qingkai Han	
<b>Reduced-Order Dynamic Modeling of a Tracked Vehicle Based on Geometric Constraints of the Ground</b> . . . . .	661
Jinyang Guo, Botian Sun, and Xuefeng Wang	
<b>Data-Driven Modeling and Robust Optimization of the Ammunition Ramming Mechanism Based on Artificial Neural Network</b> . . . . .	691
Yuntian Zhang, Longmiao Chen, Guangsong Chen, and Taisu Liu	
<b>Design and Dynamic Analysis of Z-Folding Drag Sails</b> . . . . .	707
Suyun Xing, Zhenhua Liang, Kan Zheng, Wenhe Liao, and Pan Zheng	

**Vibration and Control**

**Research on Active Vibration Control of the Plate Based on Modal Space Control** ..... 725  
 Hanjing Lu and Ziyao Ma

**Research on Dynamic Stiffness Measurement of Flexible Pipe Based on Indirect Method** ..... 741  
 Peng Chen, Xiu-feng Liu, Xing-jun Yuan, Li Chen, and Wen Luo

**Analysis and Modeling of Magnetorheological Hydro-pneumatic Spring Based on Bouc-Wen Model** ..... 753  
 Ruijing Qian, Min Jiang, Yanni Zhang, and Guoping Wang

**Research on Vibration Response of Aero-Engine Rotor with SFD Under Vertical Impact Load** ..... 773  
 Weijian Nie, Xiaoguang Yang, Guang Tang, and Jinshun Wang

**Optimization Design and Damping Performance Analysis of BMC Lathe Bed** ..... 789  
 Linhao Fan and Jiaxing Shen

**The Vibration Characteristics of Printing Moving Membrane Based on the Differential Quadrature Hierarchical Method** ..... 805  
 Mingyue Shao, Xingshui Zhao, Jimei Wu, and Jiajuan Qing

**Vibration Reduction of Tracked Vehicle-Seat-Occupant System Based on Two-Stage Magnetorheological Suspension** ..... 819  
 Rilang Jiang, Xiaoting Rui, Wei Zhu, Min Wei, Hongtao Zhu, and Lilin Gu

**Vibration Control of Magnetorheological Suspension Systems for Vehicles** ..... 841  
 Wei Zhu, Yuxin Jiang, Shenyu Zhong, Min Jiang, and Xiaoting Rui

**Adaptive Optimal Fault Tolerant Control of Self-powered Semi-active Suspension** ..... 851  
 Xiang Gao, Zhonglei Liu, Liyi Yin, Junchuan Niu, and Lei He

**Preparation and Rheological Response of Dual-Coated Carbonyl Iron Based Magnetorheological Fluid** ..... 863  
 Wen Jiao Han, Xin Wang, Guo Ping Wang, and Fu Feng Yang

**Arrangement Optimization of Multiple Elastic Supports for Piping System Using Genetic Algorithm** ..... 875  
 Ruhang Wang, Kangye Huang, and Bing Li

**Studies on Low Resonant Frequency Rubber Isolator Design** ..... 887  
 Fucai Hu, Xin Li, Xiaoqi Zhang, Jie Liu, and Yongsheng Yu

<b>Vibration Signature of Generator-Side Converter Faults for Wind Turbines</b> .....	897
Yaohua Shi, Ming Ren, Yanhui Feng, and Yingning Qiu	
<b>Output-Only Time-Varying Modal Parameters Identification Using Recursive Subspace Algorithm Based Modified FAPI</b> .....	911
Dong Jiang and Yusheng Wang	
<b>Multi-objective Optimization of Piezoelectric Energy Harvester Combined with Euler Buckled Beams Type Nonlinear Energy Sink</b> .....	927
Jun Zhang and Haiping Liu	
<b>Dynamical Modeling and Identification of a High-Performance MEMS Accelerometer with Effective Stiffness Electrostatically Tuned Around Zero</b> .....	939
Ziyi Ye, Zhipeng Ma, Yiming Jin, Mingkang Li, Leinuo Dong, Xudong Zheng, and Zhonghe Jin	
<b>Optimization of a Pseudo-Active Suspension Network</b> .....	949
Wuhan Qiu, Xianxu Frank Bai, and Lijun Qian	
<b>LQR Control Method for Vehicle Magnetorheological Suspension</b> .....	967
Yuxin Jiang and Wei Zhu	
<b>Wave Propagation and Vibration Behaviour of a Railway Track</b> .....	979
Qinghua Guan, Pu Wang, Han Zhang, Zefeng Wen, and Xuesong Jin	
<b>Design of Active Vibration Isolation Controller with Reduced Actuator Force Based on Robust <math>\mathcal{H}_\infty</math> Control Theory</b> .....	995
Yuanshenglong Li, Liping Wang, and Liwen Guan	
<b>Analysis and Optimization of Medium Frequency Noise in Vehicle Cabin Based on FE-SEA Hybrid Method</b> .....	1013
Dongye Zhang, Junjie Gu, and Yanni Zhang	
<b>Preparation Method and Simulation Analysis of a Novel High Temperature Resistant Magnetorheological Fluidier Fluids</b> .....	1025
Xing Cheng Chen, Wen Jiao Han, Guo Ping Wang, Shun Wang, and Xin Wang	
<b>Stability of Rotating Composite Thin-Walled Boring Bar Under Hygrothermal Environment</b> .....	1043
Jinfeng Zhang, Xiaohui Yang, Chao Feng, Zhong Wang, and Peisi Zhong	
<b>An Integrated Design Method Combined Electromagnetic Field and Damping Force for Magnetorheological Dampers</b> .....	1061
Min Wei, Xiaoting Rui, and Lilin Gu	

**Experimental Investigation into the Acoustic Black Hole Vibrating Absorbing Effect and Its Automotive Applications** ..... 1077  
 Yanni Zhang, Manlin Tong, Kaixing Huang, Fufeng Yang, and Xiaoting Rui

**The Comparison of Different Video Motion Magnification Methods in Vibration Measurement by Experimental Analysis** ..... 1087  
 Long Wei, Zhong Zhang, Fang Ren, Bo Gao, and Ziyuan Hao

**Three-Dimensional Solid Shaft Super-Element Transfer Matrix Method for Steady-State Response Analysis of Isotropic Rotor-Bearing System** ..... 1095  
 Jiangtao Fu, Jinghong Wang, Bin He, Kai Xie, and Yu Feng

**Experimental and Modeling Research on Magnetorheological Dampers Considering Multi-parameter Nonlinearity** ..... 1109  
 Jiaqi Wang, Guoping Wang, Rilang Jiang, Min Wei, Zhuang Jin, and Xinghua Yan

**Control of Blade-Passing Radiation Noise Throughout the Baffled Open End for a Seawater Cooling System Using Muffler-Pipeline Acoustically Coupling Effect** ..... 1123  
 Jize Zhong, Peng Wei, Changlin Qiu, and Qibin Sun

**Structural Design and Experimental Study of a Rotary Magnetorheological Damper with Higher Torque to Volume Ratio** ..... 1137  
 Xinghua Yan and Wei Zhu

**Dynamic Control of Magnetorheological Hydro-Pneumatic Suspension** ..... 1157  
 Min Jiang, Xiaoting Rui, and Fufeng Yang

**Design and Experimental Study of Magnetorheological Recoil Device Dynamics** ..... 1173  
 Lingyun Wang, Wei Zhu, Min Jiang, Zhengwei Yan, Yuxin Jiang, and Xiucai Xu

**Active Vibration Control: Two Different Experimental Approaches** ..... 1187  
 Giulio Franchini, Prabakaran Balasubramanian, Tarcisio M. P. Silva, Giovanni Ferrari, Celia Hameury, Abdulaziz Buabdulla, and Marco Amabili

**Design and Performance of a Novel Magnetorheological Fluid-Based Engine Vibration Damper** ..... 1203  
 Wenhao Chen, Yu Tao, and Siyuan Li

**Research on Active Control of Vibration of Transmission System of Power-Split HEV** ..... 1217  
 Qi Yan, Hui Liu, Keyu Yan, and Mahmoud Mabrouk

**Vibration Reduction Properties of Complex Structures with Three-Layer Acoustic Black Holes in Small Spaces** ..... 1227  
 Jiyang Zhang, Jinjin Guo, Kean Chen, Liling Tang, Shuwei Ren, Ying Xu, and Fenghua Tian

**Vibration Mitigation of Bladed Disk by Vibration Absorber Array and Experiment Validation** ..... 1237  
 Fangchao Wang, Lei Sun, Jiahang Li, and Shuai Wang

**Quasi PI-LOR Vibration Control and Its Controllability Analysis of Mechanical Systems** ..... 1253  
 Yukang Zhou, Shuo Zhang, and Suting Cai

**Research on High-Speed Camera Testing Method for Initial Disturbance of Large-Caliber Artillery Projectiles** ..... 1265  
 Zixuan Rao, Xu Zhang, Fufeng Yang, and Yu Feng

**Research on Vibration Characteristics of Triply Periodic Minimal Surface (TPMS) Porous Lattice Structure Based on SLM Additive Manufacturing Technology** ..... 1277  
 H. Wang, F. L. Guo, G. L. Wang, and D. Y. Wang

**Electromagnetic Actuator with Magnetic Gear in Vehicle Suspension for Vibration Suppression in Alternate Motion** ..... 1293  
 Ningning Zhou

**Temperature-Dependent Normalized Bouc-Wen Model for MR Damper** ..... 1303  
 Hongtao Zhu and Xiaoting Rui

**Snap Through Nonlinear Vibration Control of Bi-stable Composite Plates Actuated by MFC Intelligent Material** ..... 1313  
 He Rongbo, Hao Yuxin, and Cheng Zhuming

**Piezoelectric Shunt Damping of a Composite Cylindrical Shell for Non-stationary Stochastic Vibration Control** ..... 1327  
 Yucui Zhong, Ye Wei, Rihuan Yu, and Zhenguo Zhang

**Experimental Analysis of Dropdown Control with Active Magnetic Bearing in a Suspended Rotor Test Rig** ..... 1339  
 Pengyang Jia, Jiakang Yao, Qiang Liu, Zilin Li, Yong Zhao, Mindong Lyu, and Zixi Wang

**Analysis of Vibration Characteristics of Periodic Structure Based on Modal Synthesis Transfer Matrix Method** ..... 1355  
 Yu Feng, Bin He, Xiaoting Rui, Jiang Cui, and Shutian Li

**Analysis of Factors Affecting Response Time of Magnetorheological Damper and Its Optimal Design** ..... 1369  
 Zhengwei Yan, Min Jiang, and Wei Zhu

**Optimization of Dynamic Performance for a 6-DOF All-Metal Vibration Isolator** ..... 1385  
 Chao Zheng, Jun Wu, and Xin Xue

**Research on Fault Diagnosis and Related Control Software of Armored Vehicle Magnetorheological Suspension System** ..... 1395  
 Jiahao Liang, Hongtao Zhu, and Wei Zhu

**Vibration Optimization Design and Experiment for Support of Aeroengine High-Speed Rotor System** ..... 1413  
 Weijian Nie, Xiaoguang Yang, Wangqun Deng, and Hubiao Tang

**Research on Optimal Design Method of Multi-damper Cooperative Vibration Suppression System for Wind Tunnel Models** ..... 1425  
 Xinyu Zhang, Mengde Zhou, Yuhang Ren, Qi Zhao, Binkai Zhu, Wei Wu, Chenjin Sun, and Wei Liu

**Lightweight Lattice Sandwich Structures for Mechanical Vibration Control: A Review** ..... 1441  
 Lin-Zhi Wu, Jin-Shui Yang, Shuang Li, and Fang Yang

**H<sub>2</sub> Optimization of Tuned Mass Damper Inerter Attached to a Floating Platform Excited by Stochastic Load** ..... 1461  
 Zihao Geng, Jue Wang, and Ying Zhang

**A Unified Solution for Free Vibration Analysis of Cylindrical Shells with Arbitrary Boundary Conditions Comparing Different Thin Shell Theories** ..... 1473  
 Ganghui Xu and Changsheng Zhu

**Design and Experimental Study of a Quasi-Zero-Stiffness Vibration Isolator Based on the Spring Hinge Mechanism Metamaterial** ..... 1491  
 Yu Chu, Longlei Dong, Ao Zhang, and Jianping Zhao

**Research on Support Characteristics and Controller Design of Magnetic Bearings Considering Eddy Current Effects** ..... 1511  
 Xiang Ji, Han Wu, and Zhenjun Zhao

**Estimating Confidence in Damage Position Predictions Made Involving ANN** ..... 1541  
 Gilbert-Rainer Gillich, Cristian Tufisi, and Vasile Catalin Rusu

**Experimental Investigation on the Flow-Induced Oscillation in Deep Cavity and the Controlling Effect Using Wedge Spoiler** ..... 1551  
 Zhifei Guo, Peiqing Liu, Hu Huang, and Hao Guo

**Research and Application of Vibration and Noise Reduction Local Resonance Metamaterial Plate** ..... 1571  
 Dongxian Wang, Qian Ma, Rui Zhu, and Kaijun Yi

**Simulation and Experiment of a Novel Vibration Reduction Unit Based on Piezoelectric Shunt Damping** ..... 1587  
 Penghang Xu, Dan Wang, Weifang Chen, Rupeng Zhu, Jiawei Ding, and Shuying Yang

**Coordinated Control of Longitudinal, Lateral and Vertical Motions for Active Suspension Based on Vehicle Dynamic Model** ..... 1601  
 Xingqi Zhang, Xiaoang Liu, Chunyu An, Xing Jia, and Bo Gong

**Designing a Novel Threaded Connection Pair with an Improved Vibration Resistance** ..... 1625  
 Xi Liu, Guangming Jiao, Ce Yang, Jie Chen, Quanshi Cheng, Wensheng Li, and Sicheng Liu

**Research on the Pre-tightening Attenuation Under Static Load Conditions** ..... 1637  
 Chao Shen, Anlu Liu, Yuhong Wang, Yan Liu, Quanshi Cheng, Wensheng Li, and Sicheng Liu

**Nonlinear Dynamics**

**Analysis of Vibration Characteristics of Rotating Blades** ..... 1653  
 Yan Ye, Chengwei Chen, and Xiaodong Yang

**Dynamic Response of Electric Powertrain in Non-inertial System** ..... 1661  
 Kun Liu and Wei Wu

**Magnetic-Solid Coupling Nonlinear Vibration of Functionally Graded Cylindrical Shell in Magnetic Field** ..... 1675  
 Tao Yang and Yuda Hu

**Parametric Flutter Analysis of Camber Morphing Wing Using Beam-Plate Coupled Model** ..... 1685  
 Ke Huang, Jiaying Zhang, and Qingyun Wang

**Stochastic Dynamics of a Unilateral Vibro-impact System Driven by Gaussian White Noise** ..... 1703  
 Haitao Hu, Dongliang Hu, and Wenchao Sun

**The Nonlinear Dynamic Characteristic and Resonant Actuation of Bistable Composite Laminates with MFC** ..... 1719  
 Yuting Liu, Jiaying Zhang, and Qingyun Wang

**Dynamic Simulation and Analysis of DEA Based on ANCF Three-Dimensional Triangular Thin Plate Element** ..... 1739  
 Chao Liu, Yulong Su, Xingchi Lei, Dongdong Han, Yi Ding, Yuhan Sun, Xing Tang, and Pengfei Li

**Dynamic Responses on the Vortex-Induced Vibration of the Riser Under the Dual Parametric Excitation** ..... 1759  
 Dan Wang, Zhifeng Hao, Fangqi Chen, and Marian Wiercigroch

**Suppressing Chatter Behavior of the Nonlinear Damping in Composite Boring Bar** ..... 1771  
 Jinfeng Zhang, Zhong Wang, Chao Feng, Xiaohui Yang, and Peisi Zhong

**Dynamic Modeling and Simulation of a Propulsion Shaft System Considering the Bearing Clearance** ..... 1785  
 Xinbin Li, Yajun Xu, and Jing Liu

**Study of Skidding and Friction Torque for a Deep Groove Ball Bearing in a Permanent Magnet Synchronous Motor** ..... 1797  
 Yajun Xu, Xinbin Li, and Jing Liu

**Study on Roller Bearing Power Loss Calculation Considering the Raceway Fault** ..... 1807  
 Zhifeng Shi, Jing Liu, and Yongqiao Wei

**Vibration Model of Operating Transformer Windings Considering the Dynamic Stiffness** ..... 1819  
 Yao Yuan, Linjie Zhao, Jiahui Yang, Xi Zhang, Wenhao Li, and Kaixing Hong

**Research on Seismic Shaking Table Test Based on Large LNG Storage Tank** ..... 1831  
 Juan Su, Guanghui Zhu, Yongsheng Jiang, Wenjie Li, and Cheng Chen

**Dynamic Analysis of Ravigneaux Planetary Gear Set with Floating Sun Gear** ..... 1845  
 Yachao Sun, Yang Yang, Jianghai Shi, Minggang Du, and Hongrui Cao

**Dynamic Response Analysis of a Van der Pol-Mathieu-Duffing Type System** ..... 1859  
 Mengyao Zhang, Dan Wang, Zhifeng Hao, and Yushu Chen

**Research on the Dynamic Performance of Tether-Net Closing Mechanism in Space Debris Capture** ..... 1871  
 Mengsheng Li, Shuai Yue, Jiyue Si, and Zhonghua Du

**Study on the Dynamic Response of the Solar Panel Adsorption Device to the Satellite System During the Attachment Process** ..... 1887  
 Hao Zhou, Haibo Yang, Songlin Yang, Xiaochun Yin, and Wenhe Liao



**Study on the Shafting Vibration by Non-newtonian Fluid Lubrication Layer** ..... 1899  
 Jiangbo Zhu, Xi Chen, Qingyuan Wan, and Xiaoshen Ning

**The Research on Boundary Element Method of Cavitation Characteristics of Two-Dimensional Hydrofoil** ..... 1913  
 Zhenxing Zhao, Xusheng Li, Weipeng Zhang, and Chuanzhi Duan

**Application of the Subdivision Strategy in Global Optimal Tracking Control with Adjoining Cell Mapping** ..... 1923  
 Yongdong Cheng and Zhui Tian

**Experimental and Numerical Simulation Study of Dynamic Mechanical Behavior of AlMgB<sub>14</sub> Ceramic** ..... 1941  
 Zhenyi Zhang, Fangchao Xia, Zhongchen Cao, and Fei Yuan

**Stability and Bifurcation Analysis of a Composite Laminated Cantilever Rectangular Plate System** ..... 1955  
 Shuping Chen

**Research on Constitutive Model of Stiffness and Damping of Nitrile Butadiene Rubber** ..... 1965  
 Kaijie Chen, Weifang Chen, and Yanfeng Zhou

**Nonlinear Dynamic Characteristics Analysis of Diaphragm Coupling Rotor System with Crack Fault** ..... 1981  
 Su Nong, Weifang Chen, and Ning Zhang

**Nonlinear Vibration of a New Three-Phase Composite Cylindrical Shell** ..... 1993  
 Hui Ying Zheng, Tao Liu, and Yan Zheng

**Static Nonlinear Modeling and Correction of Spring Element in Bolted Structure of Aeroengine** ..... 2003  
 Diwen Zhao, Wensheng Li, Quanshi Cheng, Yan Liu, Sicheng Liu, Yanwei Xu, and Yu Liu

**Nonlinear Dynamics of a Six-Dimensional Aeroelastic System** ..... 2021  
 Li Zhang

**Analytical Mechanics**

**Effect of Rare Earth/Stable Element Oxides on High Temperature Mechanical Properties of Low Chromium Nickel Ferritic Stainless Steel** ..... 2035  
 Lihang Ma, Yonghuan Guo, Keyu Gu, and Kaipeng Liang

**Dynamic Response Analysis on Tensile Membrane Structure According to the Wind-Rain Interaction Model** ..... 2043  
 Zhengchao Wang, Limei Zhang, Jinpeng Liu, and Changgeng Gao

**Analytical Unloading Model for the Low Velocity Impact of Particles** ..... 2053  
 Panpan Weng and Xiaochun Yin

**Early Post-yield Contact Behavior of Rigid Sphere Against the Elastic-Plastic Half-Space** ..... 2067  
 Hao Yuan and Xiaochun Yin

**Design of Modular Truss Components for On-Orbit Robotic Assembly** ..... 2081  
 Zeyu Sheng, Zishuo Chen, Hao Wen, and Weidong Chen

**Study of Hysteresis Characteristics of Marine Dampers Under Shock Environment** ..... 2093  
 Yanfeng Zhou, Dan Wang, Zhonghui Qiu, Kaijie Chen, Weifang Chen, and Rupeng Zhu

**The Birkhoff’s Equation and Its Integral Theory for Constrained Systems** ..... 2105  
 Jinchao Cui, Ling Yin, Yue Zhou, and Yong Wang

**Multibody System Transfer Matrix Method (Rui Method) and Its Applications**

**Reduced Multibody System Transfer Matrix Method for Ship System Vibration Modeling** ..... 2119  
 Xue Rui, Bin He, Xun Wang, Feiyu Hao, Yiheng Chen, Jinghong Wang, Hanchen Cao, and Yibing Hou

**Direct Differentiation Sensitivity Analysis Based on Reduced Multibody System Transfer Matrix Method** ..... 2131  
 Guoping Wang, Tianxiong Tu, Yunfei Miao, and Xiaoting Rui

**Study on the Rheological Properties of Propellant Substitute During Plasticization Process** ..... 2149  
 Xiejian Shao, Bao Rong, Hailong Yu, and Xiaoting Rui

**An In-Bore Projectile and a Flexible Tube Seen as a Superelement in Launch Dynamics Using Reduced Multibody System Transfer Matrix Method** ..... 2161  
 Qinbo Zhou, Jianshu Zhang, Xun Wang, Geng Li, and Xiaoting Rui

**Internal Ballistic Optimization Design Based on Improved Particle Swarm Optimization Title** ..... 2175  
 Bowen Zhang, Guoping Wang, and Xin Zhao

**Free Vibration of Double Beam System Based on the Multibody System Transfer Matrix Method** ..... 2185  
 Shaoheng Hu, Zhengquan Liu, Xiaoting Rui, and Junjie Gu

**An Efficient Three-Node Beam Element for Large Deformation Analysis Using Absolute Nodal Coordinate Formulation** ..... 2201  
Huaqing Zhou, Bin He, Hui Ren, Jiang Cui, Feiyu Hao, Yu Feng, and Xiaoting Rui

**Dynamics Modelling of Milling Robot with Variable Posture** ..... 2217  
Zan Li, Bo Li, Wei Tian, Guangyu Cui, and Yu Zhao

**Static Response of a Multiple Launch Rocket System During Launch Using Linear Multibody System Transfer Matrix Method** .... 2227  
Hongfei Huang, Qinbo Zhou, Guoping Wang, and Bin He

**Dynamics Modelling and Simulation of Parachute Cluster Based on Rmstmm** ..... 2241  
Youyu Wang, Guoping Wang, Yutian Sun, Chongwei Han, and Lilin Gu

**Research on Misalignment of Machine Tool Spindle Coupling Based on Transfer Matrix Method** ..... 2261  
Yiheng Chen, Xiaoting Rui, Yuanyuan Ding, Hanjing Lu, and Yu Chang

**Research on Simulation and Optimization of Pulse Controlled Multiple Launch Rocket System** ..... 2273  
Lilin Gu, Xiaoting Rui, Guoping Wang, and Min Wei

**A Parallel Algorithm for the Natural Frequency of Chain Systems on CPU-GPU Heterogeneous Computing Systems** ..... 2285  
Yijia Peng, Xiaoting Rui, Guoping Wang, and Junjie Gu

**Research on the Symbolic Deduction Method for the Overall Transfer Matrix of Multibody System by Computer** ..... 2299  
Gangli Chen, Xiaoting Rui, Xiaoyun Zeng, Xingbao Liu, and Hanjing Lu

**Study on the Reduced Multibody System Transfer Matrix Method of Spatial Curved Beams with Large Motion** ..... 2317  
Xizhe Zhang, Xiaoting Rui, Jianshu Zhang, Junjie Gu, and Lina Zhang

**Research on Multibody Dynamics Modeling and LQR Optimal Active Vibration Control of Milling Robots** ..... 2333  
Shengli Song, Bo Li, Jun Wang, and Wei Tian

**Track System Dynamic Analysis by the Riccati Multibody System Transfer Matrix Method** ..... 2345  
Yangyang Miao, Xiaoting Rui, Pingxin Wang, and Jianshu Zhang

**Steady-State Response Analysis of Double-Beam System Based on the Reduced Multibody System Transfer Matrix Method** ..... 2357  
Zhengquan Liu, Guoping Wang, Xiaoting Rui, and Shaoheng Hu

**Collision Dynamics Analysis of the Adsorption Mechanism Under the Micro-Gravity Environment in the Space** ..... 2369  
 Yunfei Miao, Wei Tian, Guoping Wang, and Xiaoting Rui

**The Large Deformation Analysis of Thin Beam Using Absolute Nodal Coordinate Formulation and Newmark Integration Method** ..... 2381  
 Feiyu Hao, Bin He, Jiang Cui, Xue Rui, Yu Li, Huaqing Zhou, and Xiaoting Rui

**Definition of Standard Input Data in Launch Dynamics of Multibody Systems** ..... 2397  
 Geng Li, Qinbo Zhou, Guoping Wang, and Tang Li

**Algorithm and Software of Multibody System Dynamics**

**High Speed Impact Response of CFRP Clad Blades** ..... 2419  
 Chengwei Chen, Yan Ye, and Xiaodong Yang

**Position-Based Visual Servo Control for Robotic Manipulation of Space Structures** ..... 2435  
 Yining Wang, Wei Zhang, and Hao Wen

**The Vibration Signal Analysis System of the Ultra-Precision Fly Cutting Machine Tool** ..... 2445  
 Yuanyuan Ding, Xiaoting Rui, Guoping Wang, Jianguo Ding, Jianshu Zhang, Hanjing Lu, Yiheng Chen, and Yu Chang

**Dynamic Response and Optimal Design of High Altitude Test Platform Under Extreme Wind Load** ..... 2465  
 Zhanchao Jiang, Huaiping Ding, Cheng Gao, and Lin Zhang

**Influence of the Initial Dynamic Vivacity Ratio’s Accuracy of Propellant Charge** ..... 2481  
 Chao Li, Xiaoting Rui, and Zhicheng Lin

**Algorithm and Software Implementation of Track Chain Automatic Assembly for Tracked Vehicle** ..... 2491  
 Kai Huang, Pingxin Wang, Fufeng Yang, and Lei Zhou

**Adaptive Elliptic Basis Function Model Construction Strategy Based on Particle Swarm Optimization** ..... 2507  
 Shengtan Lin, Bao Rong, and Shuai Yang

**Study on the Direct Differential Method in Constraint Violations for the Reduced Multibody System Transfer Matrix Method** ..... 2521  
 Lina Zhang, Xiaoting Rui, Jianshu Zhang, Junjie Gu, and Xizhe Zhang

**Fairing Separation-Attitude Control Coupling Simulation Based on the Self-controlled Multi-body Dynamics Software Tianxing** ..... 2535  
Huimin Zhang, Lijun Gao, Kai Yan, Xuanbo Shu, Jiajia Liu, and Wei Liu

**Design and Application of Multi-body Dynamics Optimization Design Software Architecture** ..... 2547  
Shuai Yang, Bao Rong, and Shengtian Lin

**Dynamics Modeling and Simulation of Configuration in Corotating Twin Screw Extruder** ..... 2563  
Zhanhong Xiao, Bao Rong, Xiaoting Rui, and Pu Zhao

**Numerical Method on Intersecting Line of Biased Sphere and Cone** ..... 2579  
Chunming Li

**Review on Wheelset Maintenance Strategies Using Physical and Data-Driven Models in Railway Transportation** ..... 2595  
Ruichen Wang and Yongqiang Liu

**Launching Charge Extrusion Crushing Dynamics Simulation Software** ..... 2609  
Jialei Zhang, Guoping Wang, Xiaoting Rui, Yan Wang, Chao Li, and Xiaoli Dong

**Dynamic Response Software for Wind Turbine Based on Multibody System Dynamic Algorithm and Mode Summation Method** ..... 2627  
Jian Wang, Zhengwei Zhang, Kai Zhang, Hua Zhang, Song Huang, and Ziwen Chen

**Development of a Cohesive Strengthening/Damage-Plasticity Model Based on DEM and Its Parameter Influence Analysis** ..... 2649  
Xiangbo Xiong and Xuejun Wang

**Stochastics and Uncertainty Modeling**

**Study on Interval Optimization of Interior Ballistic of Large-Caliber Artillery** ..... 2663  
Xinjia He, Xiaoting Rui, and Yan Wang

**Uncertainty Quantification in Impulse Thruster Performance Using Polynomial Chaos Expansion** ..... 2675  
Qingwei An, Jun Zhang, Ling Tao, Ruyi Tao, and Wenjun Ruan

**Bayesian Modelling and Uncertainty Analysis for Wire Rope Defect Signal Recognition** ..... 2689  
Shiwei Liu, Yong Liu, Weiguo Lin, and Qiaohua Wang

**An Assessment Method of Launch Safety of Propellant Charge Based on Information Measure Equivalency** ..... 2711  
 Zhicheng Lin, Yan Wang, and Chao Li

**Time-Dependent Reliability Analysis of Random Vibration Based on Deep Neural Operator Surrogate Model** ..... 2721  
 Bo Wang, Shuo Wu, Shengnan Lyu, and Tianxiao Zhang

**Tribology and Low-Speed Impact**

**Penetration Simulation and Structure Design of a Detector for Outer Planetary Surface Impact Detection** ..... 2739  
 Zhiqing Geng, Yuming Peng, Liang Xu, Cheng Zhou, Fan Huang, Xi Lu, and Wei Wang

**Elastic–Plastic Investigation of Shipboard High-Energy Pipes Under Shock Loading** ..... 2755  
 Lijiang Zhou, Weicai Peng, and Zhiyun Xu

**Analysis of the Mean Pressure for Elastic Impact Considering Wave Propagation** ..... 2767  
 Bo Yu and Xiaochun Yin

**Evolution of Wave Propagation in Two-Dimensional Hexagonal Packed Granules with Defects** ..... 2775  
 Xiaomao Wu, Shunyuan Mao, and Hui Wang

**Research on Crack Propagation Law of Rifle in Gun Barrel Under Cyclic Impact Load** ..... 2791  
 Fanfan Zhang, Bianfang Ning, Bin Gu, and Hua Gao

**Numerical Simulation Study of Rigid Projectile Impacts the Concrete at Low Speed** ..... 2803  
 Yingchao Wu, Xiaoke Gao, Yongtao Zhang, and Jianbin Liu

**Study on the Microcrack Friction Ignition Mechanism of Explosive Charge** ..... 2817  
 Wei Liu, Guoping Wang, Jian Gu, Xiaoting Rui, Chao Li, Yan Wang, and Xin Zhao

**Research on Friction and Wear Mechanism of Gun Barrel Matrix Material** ..... 2829  
 Huan Liu, Fanfan Zhang, Amin Ma, Jiaying Li, and Yingchao Wu

**Numerical Simulation Research on Cutting Forming Process of Energetic Materials** ..... 2845  
 Pu Zhao, Bao Rong, Xiaoting Rui, Zhanhong Xiao, and Jun Wang

<b>Simulation and Experimental Study on the Impact Force of the Elastic Belt and the Central Part</b> .....	2859
Qiyong Wei and Fufeng Yang	
<b>Dynamic Modelling of Solid-Lubricated Ball Bearings Based on the Spinning Traction Curve of Ball</b> .....	2875
Yuhao Zhao, Yanyang Zi, Zhenyi Chen, and Mingquan Zhang	
<b>Vertical Deflection and Energy Dissipation Analysis of Jointed Structure Considering Microscopic Roughness</b> .....	2889
Xin Yu, Yunyun Sun, Shijing Wu, and Sheng Liu	
<b>Parallel Mechanism and Robotic System Dynamics</b>	
<b>Kane Formulation Based Dynamic Modelling and Neural Network Adaptive Sliding Mode Control for a Redundantly Actuated Parallel Robot</b> .....	2905
Manjun Cui, Dong Liang, Junpeng Zhang, and Huizhou Jia	
<b>Kinematics, Dynamics and Simulation of a Novel Schönflies-Motion Parallel Mechanism</b> .....	2921
Junpeng Zhang, Dong Liang, Fulin Yao, and Manjun Cui	
<b>Dynamic Modeling and Simulation of a Crocodile-Like Robot</b> .....	2941
Le Kuang, Zhiqin Zhuo, Qin Zeng, Jianping Jiang, Jiahui Luo, and Xiaoming Xu	
<b>Design and Kinematic Analysis of a Parallel Space Pointing Mechanism Driven by Ultrasonic Motors</b> .....	2961
Tianlu Huang, Xiaoniu Li, Lin Yang, Lingfeng Tang, and Dengxian Zhou	
<b>Model Predictive Control for Cable-Driven Parallel Robots Using Moving Horizon State Estimation</b> .....	2975
Yue Hou, Xiaodong Song, Zhiquan Kong, Tong Chen, and Huan Zhang	
<b>Multi-degree-of-Freedom Lumbar-Hip-Assisted Exoskeleton Design and Model-Free Impedance Control Based on Time-Delay Estimation</b> .....	2987
Zhanxiang Duan, Yang Tian, and Haoping Wang	
<b>Singularity Elimination of 3-RPR Planar Parallel Mechanisms Via Topological Reconfiguration</b> .....	3001
Jingjing You, Ningning Huang, Pengda Ye, and Bibek Rai	
<b>Coupled Dynamics Modeling and Analysis of a Coring Drilling Equipment for Hard-Rock Tunnel Boring</b> .....	3015
Dong Yuan, Xin Sun, Lijin Hu, Qiang Peng, Xinzhili Chen, Yiyu Li, Sen Huang, Liugang Zhao, and Bo Li	

**Design and Dynamic Analysis of a Linear Single-Pendulum Bouncing System with a Spring-Double-Mass Model** ..... 3035  
 Dan Yu, Yan Li, Changming Song, Xiao Yang, Zongyuan Ren, Haijian Zhang, Yiran Wang, Hanbing Zhou, Yingsen Du, and Fei Wang

**Topology Design and Dynamic Modeling of a 2T Parallel Mechanism with the Larger Workspace and Symbolic Forward Kinematics** ..... 3049  
 Junjie She, Ju Li, Wenqin Ding, and Huiping Shen

**Fluid-Solid Coupled Systems**

**Study on the Effect of Dynamics Factors on Extrusion Forming Process of Single-Hole Energetic Materials by Finite Element Method** ..... 3065  
 Jingyu Zou, Bao Rong, and Xiaoting Rui

**Dynamic Design Method of Vortex Induced Vibration Suppression Device for Strakes at High Reynolds Number** ..... 3081  
 Dongyang Chen, Xinsheng Zhang, Zhi Rao, Yaochen Lin, Guang Pan, and Jiayi Li

**Investigation of Cavitation Phenomena in the Hydraulic Shock Absorber Based on FSI FEA Method** ..... 3097  
 Wenxue Xu, Wenjian Xie, Yunling Yang, and Shuguang Fu

**A Calculation of Interior Ballistic of Large-Caliber Naval Gun Based on Two-Phase Flow Dynamics Theory** ..... 3109  
 Weihao Huang, Chao Li, Xiaoli Dong, Haodong Chai, and Guoping Wang

**Research on the Virtual Experiment of the Ground Active Flutter Suppression via the Receptance Method** ..... 3125  
 Zhijun Yang, Zhong Zhang, Bo Gao, and Jing Guo

**Experimental Study on Fragmentation Law of Propellant Bed Under the Mechanics Situation in the Chamber** ..... 3141  
 Yan Wang, Chao Li, Xin Zhao, Xiaoting Rui, Dayong Li, Zhicheng Lin, and Puhui Zhang

**Exact Coherent States in Large Computational Domains Under Normal Magnetic Field** ..... 3153  
 Xiaomeng Shi, Shunzhi Li, Sen Li, Lebing Wang, and Shuai Dong

**Numerical Simulation-Based Flow Field Optimization of SCR Denitrification System for Iron Ore Sintering Flue Gas** ..... 3163  
 Kun Hai and Xiaochun Yin



<b>Edge States and Phase Space of Channel Flow with Spanwise Magnetic Field</b> .....	3179
Sen Li, Xiaomeng Shi, Lebing Wang, Shunzhi Li, and Shuai Dong	
<b>Microstructural Mechanical Analysis and Dynamics Simulation of Hollow Soft Magnetic Particle-Based Magnetorheological Fluids</b> .....	3187
Shun Wang, Bin He, Wenjiao Han, Xingcheng Chen, and Xin Wang	
<b>Exact Coherent States and Phase Space Geometry of Channel Flow with Streamwise Magnetic Field</b> .....	3201
Lebing Wang, Xiaomeng Shi, Sen Li, Shunzhi Li, and Shuai Dong	
<b>Simulation Analysis on the Ignition Mechanism of Box Propellant Under Temperature Variation Condition</b> .....	3209
Xin Zhao, Xiaoting Rui, Yan Wang, Haodong Chai, and Bowen Zhang	
<b>Analysis of Dynamic Characteristics of Active Defense System During Rapid Attitude Adjustment</b> .....	3219
Deng Wu, Jinyao Zheng, Jiarong Zhou, Ling Tao, Qingwei An, Ruyi Tao, Wenjun Ruan, and Xiao Wang	
<b>A Fluid–Solid Coupled Calculation Method of Shock-to-Detonation Transition in High Explosives</b> .....	3231
Xiaoli Dong, Xiaoting Rui, Chao Li, and Xin Zhao	
<b>Numerical Study of Centrifugal Dewatering Process of Cotton Fibers</b> .....	3245
Da Li, Bao Rong, Xiaoting Rui, and Yixin Liu	
<b>FSI Analysis of Delivery Catheter Impact on Carotid Artery in AIS</b> .....	3253
Shuo Wu, Tianxiao Zhang, Bo Wang, and Shengnan Lyu	
<b>Investigation of the Vibration Behavior of a Foil Thrust Bearing Housing Under Angular Disturbance of the Runner</b> .....	3265
Rui Chen, Chuanbing Zhang, Yongjun Cheng, Bi Wang, and Zixi Wang	
<b>Dynamic Characteristics of a Centrifugal Pump with Fluid-Structure Interaction Method and on Consideration of Added Mass</b> .....	3281
Yuhan Gao and Lei Tan	
<b>Gust Load Alleviation on a Flying Wing Aircraft Based on Equivalent Input Disturbance Method</b> .....	3291
Yong H. Zhao and Li Q. Zhang	

**Drainage Efficiency Analysis of Different Hanging Structures for High Anal Fistula Surgery** ..... 3305  
 Zhen Wang, Huaiping Ding, and Zhanchao Jiang

**Inverse Problems and Data Driven Dynamics**

**Load Identification Method for Spindle Rotor System of Rolling Mill Based on Fusion Information** ..... 3319  
 Kun Zhang, Yanjie Zhang, and Fengyi Zhang

**A Novel Method for Repairing Missing Data of Bearing Vibration Signals Based on Compressed Sensing** ..... 3329  
 Haiming Wang, Yongqiang Liu, Shaopu Yang, and Qiang Li

**Kinematic State Monitoring for Flexible 3-D Beams Based on Fiber-Optic Strain Measurement** ..... 3337  
 Wu Maoqi and Tan Shujun

**Research on Dynamic Responses of Composite Laminates for Impact Load Identification** ..... 3345  
 Yuqing Qiu, Hongli Ji, Chongcong Tao, and Jinhao Qiu

**Acquisition Method of Time–Frequency Distribution Based on Short-Time Fractional Fourier Transform** ..... 3359  
 Bo Gao, Zhong Zhang, and Ben Wang

**Fault Feature Extraction Based on Unsupervised Graph Embedding for Harmonic Reducers Diagnosis** ..... 3375  
 Shilong Sun and Hao Ding

**Automated Frequency Domain Decomposition Method Based on Convolutional Neural Network** ..... 3391  
 Shuhong Zeng, Jie Kang, Jie Luo, and Jiabao Sun

**A Method for Operational Modal Parameters Identification of Attitude and Orbit Control Engine** ..... 3407  
 Ao Zhang, Longlei Dong, Jian Liu, Gang Jiang, Yaoyao Guan, and Xiaoyi Wang

**Using Elementary Mechanical Networks to Model and Recognize Multi-environment Contacts for the Earthworm-Like Robot** ..... 3419  
 Hao Sun, Kunpeng He, and Xiaoxu Zhang

**Programmable Dynamic Modeling and Parameter Identification for Serial Manipulators** ..... 3435  
 Shiheng Xu and Xiaoxu Zhang

**A Damage Localization and Severity Quantification Method Based on Eigenvalue Assignment** ..... 3447  
 Zihao Zhang, Shancheng Cao, and Chao Xu

**Applications of MSD Methods on Acoustics, Optics, Electricity, Magnetism and Thermology**

**Study on Discharge Characteristics of Ionizing Sensor Based on Hydrodynamics** ..... 3463  
 Changyi Liu, Yuan Zhang, and Minxiang Chen

**Estimation of a Tank’s Noise Source Level by Utilizing Noise Attenuation Algorithm Inversion** ..... 3481  
 Xin Yang, Bao Men, Jie Zhang, and Quanzhao Sun

**Influence of Temperature on Hydraulic Pneumatic Buffer Dynamics** ..... 3489  
 Tang Li, Xiaoting Rui, Jianshu Zhang, Qixing Yue, and Geng Li

**Establishment of Coupling Simulation Model of Diesel Engine Combustion Process and Mechanical System Dynamics** ..... 3499  
 Jiangrui Fan, Jianshu Zhang, and Hailong Yu

**FE–BE Couple Method of 3D Electromagnetic Launch Dynamics Analysis** ..... 3511  
 Jiawei Wang, Bin He, Hailong Yu, and Nan Wu

**Studies on Low Frequency and Broadband Anechoic Termination Design** ..... 3523  
 Fucai Hu, Zhiyi Hu, Xiaoqiong Chen, Linke Zhang, and Xiaoqi Zhang

**Modeling and Simulation of the Projectile’s In-Bore Motion of Rifled Gun in Launch Dynamics** ..... 3535  
 Qi-xing Yue, Xiao-ting Rui, and Jian-shu Zhang

**Nitrocellulose Thermodynamic Parameters Based on Calorimetric Testing** ..... 3547  
 Yangyang Ding, Bao Rong, Yan Wang, and Yulong Fang

**Dynamics of Connection Structures**

**Design of Connection Unlocking Device Based on Energy Release Control and Research on Sensitive Factors** ..... 3565  
 Ye Yaokun, Ding Feng, Zhu Jialin, and Wang Haowei

**Dynamic Characteristics Analysis of Connection Structure of C/SiC Ceramic Matrix Composites** ..... 3581  
 Zhiqiang Li, Bo Gao, Zhijun Yang, Yao Li, and Zhong Zhang

**Dynamic Characteristic Analysis of Rudder System Transmission Mechanism Considering Clearance** ..... 3593  
 Xiaobo Ji, Xiaokai Mu, Wei Wei, Haitao Jiang, Qingchao Sun, and Wei Sun

**Research on Transmission Mechanism Synchronism of Hydraulic Thrust Reverser Actuation System** ..... 3607  
 Jie Yuan, Meng Zuo, Tong Liu, Yangtao Tian, and Wenshan Wang

**Dynamics Analysis of Electromechanical Actuator System Considering Multiple Frictional Nonlinearities** ..... 3623  
 Xiaozhong Wan, Xin Zhang, Ning Guo, and Chao Xu

**Buckling Analysis of Viscoelastic Composite Bistable Column-Shell Booms** ..... 3639  
 Haoyu Wang, Ning Guo, and Chao Xu

**Research on Improving Vertical Target Dispersion of Light Vehicle-Mounted Anti-aircraft Gun Based on Firing Line Stabilization** ..... 3649  
 Tianfeng Fan, Puyi Wang, Yafeng Tian, and Fanzhe Meng

**A Modeling Method to Describe the Response and Failure of Bolted Joints Subjected to Impact Loading** ..... 3665  
 Hao Chen and Zhiming Hao

**A Novel Tangential Friction Modelling Approach Considering Multi-scale Contact Pressure Distribution for Predicting the Nonlinear Dynamics of a Bolted Joint** ..... 3675  
 Huiyi Yang, Dongwu Li, and Chao Xu

**Vibration Characteristics and Finite Element Analysis of Circular Flexure in Harmonic Gear Using Carbon Fiber Composites** ..... 3689  
 Jianxiao Zheng, Xiaokang Zhang, Baoliang Guo, and Zhuo Chen

**Design Method for Irregular and High Stiffness Support Platforms with On-Orbit Maintenance Interfaces** ..... 3699  
 Qian Xue, Chuang Liu, Jiang Yang, and Lingbo Xue

**Spacecraft Dynamics**

**Research on Launch Recoil Characteristics of Aluminum Honeycomb Buffer Under Pyrotechnic Device** ..... 3709  
 Wenhui Shi, Shuai Yue, and Zhonghua Du

**MBSE-Based Guidance System Simulation of Launch Vehicle** ..... 3725  
 Guowei Ma, Qingtao Wang, Wenfeng Zhang, Rendong Yu, and Xiong Liu

**Three-Dimensional Flow Field Simulation of Cavity with an Embedded Mounting Device** ..... 3737  
 Xiangshu Zhao, Jianguo Ding, Hui Zhuang, and Peng Chen

<b>A Study on Structural Dynamic Characteristics and Topology Optimization of Loitering Munition Under High Overloads</b> .....	3749
Jiaxing Li, Haiqi Zhou, and Qiang Jia	
<b>Nonlinear Aerodynamic Modeling and Analysis on Body of Fixed Canard Dual-Spin Projectiles</b> .....	3759
Xinxin Zhao, Jinguang Shi, Zhongyuan Wang, Ning Zhang, and Cheng Wang	
<b>Safety-Critical Control for Hypersonic Vehicles with Angle of Attack Constraint</b> .....	3775
Qingli Lu, Ruisheng Sun, and Yu Lu	
<b>The Method of Designing Tri-Axial Vibration Test Profile for Spacecraft</b> .....	3789
Hanping Qiu, Xinming Li, Chuang Liu, Yaoqi Feng, Jianbin Zhu, Dong Li, Hao Sun, Yi Li, and Zhaoyan Liu	
<b>A Micro-vibration Test Method for Satellite Based on Dual-Stage Gravity Compensation System</b> .....	3807
Jianbin Zhu, Wenbing Zhang, Chuang Liu, Hanping Qiu, and Dongdong Lu	
<b>Modeling and Verification of in Orbit Dynamics and Attitude Control of Satellites with Dual Axis Solar Wings Based on Electromechanical Coupling Method</b> .....	3817
Fuxiang Dong	
<b>Comparison of the Flow Field and Thrust Characteristics of Solid Rocket Motor with Conventional Nozzle and Canted Nozzle</b> .....	3833
Yue Li and Cheng Cheng	
<b>Parameterized Modelling of Stage Separation of Launch Vehicles with Modelica</b> .....	3853
Wenfeng Zhang, Xiaoshuang Cai, Zhendong Liu, Xiong Liu, and Yifan Tong	
<b>Study of Recoverable Liquid Launch Vehicle Stage Separation Based on Equivalent Model of Large-Amplitude Liquid Slosh</b> .....	3875
Yu Lu, Baozeng Yue, Bailong Hao, and Bole Ma	
<b>Impact Effect Analysis of a Special Blade Missile Hitting a Car Target</b> .....	3891
Meng Zhang, Shuping Huang, Weiqi Yang, Guoliang Ma, and Jianjun Jia	
<b>Analytical Model of Windage Power Loss for Aerospace Spiral Bevel Gears in Air Phase</b> .....	3901
Rong Kai, Li Bo, and Wang Sanmin	

**Novel 6dof EMM for Propellant Sloshing in Zero-Gravity (Wobbling Mass Model) . . . . . 3915**  
 Chourouk Ben Hassine, Mohamed Chihi, and Baozeng Yue

**Seizing the Opportunity: Partnering with China’s International Lunar Research Station (ILRS) and Deep Space Exploration Projects for Mutual Collaboration and Scientific Advancement . . . . . 3933**  
 Ahmet H. Takan and Baozeng Yue

**Design and Control of a Free-Floating Robot for Ground Microgravity Experiment . . . . . 3943**  
 Yong Lin and Minghe Shan

**A RAM Projectile Prediction Method Based on Ballistic Trajectory Integration . . . . . 3963**  
 Qicheng Zha, Chen Qian, Yafei Wang, Shen Liang, and Lianzhong Zhang

**Dynamics of Small Celestial Body and Orbit Design Under Low Thrust Spacecraft . . . . . 3981**  
 Danhe Chen, Kai Wang, Zhihong Yang, and Wenhe Liao

**Modeling and Simulation of Stage Separation System of Launch Vehicles Based on MWorks . . . . . 3997**  
 Jinrui Pu, Qingtao Wang, Zhendong Liu, Xiaoshuang Cai, and Xiong Liu

**Rapid Modeling and Model Order Reduction of Launch Vehicle Based on Digital Twin . . . . . 4017**  
 Tianyou Huang, Qingtao Wang, Xiong Liu, Zhendong Liu, and Qixiao Wang

**Vehicle Dynamics**

**Dynamic Performance Analysis of Track Rubber Bushing Considering Thermal Stress Coupling . . . . . 4035**  
 Lei Zhou, Pingxin Wang, Hailong Yu, and Kai Huang

**Contact Analysis Between Rollers and Raceway of Axle Box Bearing Under Multi-source Fault . . . . . 4049**  
 Qiaoying Ma, Shaopu Yang, and Yongqiang Liu

**Analysis of a Pseudo-active Vehicle Suspension . . . . . 4065**  
 Xianxu Frank Bai and Zhuangzhuang Lv

**Research on Key Parameters Identification Method of Dummy Model in Vehicle Collision Simulation . . . . . 4081**  
 Rui Zhao, Yong Wang, Jianguo Ding, Yin Zhang, and Yumeng Chen