

## 目 次

### 高端论坛

月面建造工程的挑战与研究进展 ..... 丁烈云,徐 捷,骆汉宾,蔡礼雄(277)

### 基础研究

空间变过载下液氢输送管内气泡动力学特性仿真研究 ..... 王 磊,李江道,尚 锐,王娇娇,严 天,厉彦忠(286)

助推器头部跨音速脉动压力 CFD 数值仿真 ..... 沈 丹,苏 虹,徐珊姝(293)

航天回转支撑机构滚子动态特性刚柔耦合分析 ..... 江国宝,杨德财,孟凡明(299)

实践十号搭载白色念珠菌的代谢组学分析 ..... 赵光显,王佳平,刘 宇,高建义,辛冰牧,王 珩,李勇枝(308)

模拟不同重力水平下多种步态中下肢关节运动特征研究 ..... 罗诗瑶,杨洪瑞,尚 坤(316)

高速再入发汗热防护效果计算与试验研究 ..... 逯雪铃,孟希慧,任淑杰,张庆兵,张 博,姚 军,郭 瑾,黄海明,彭锦龙,周 凯(324)

面目标回波处理算法对比及 OCOG 算法的改进分析 ..... 丁凯生,孙 武,徐秋锋,吴 堃(332)

等离子体炬电弧放电热膨胀不稳定性分析 ..... 任琼英,赵晶晶,丁 亮,郑慧奇,唐振宇,赵 华(340)

### 工程技术

面向在轨服务任务的气囊型软体机械臂运动学建模与分析 ..... 刘红卫,张 翔,黄奕勇,陈小前(347)

基于碳纳米纸传感器的复合材料结构低速冲击损伤监测 ..... 卢少微,杜 凯,王晓强(355)

一种基于 Hohmann 最优交会的寻的制导方法 ..... 陈长青,解永春,安思颖(362)

考虑多参数变化的 POGO 振动稳定性分析 ..... 周星光,孙 冰(367)

空间机械臂关节的热设计与热分析 ..... 刘春龙,郭 亮,胡日查,张旭升,黄 勇,吴清文,史士财(372)

一种火箭基组合循环动力空天飞行器总体设计分析 ..... 陈 兵,龚春林,唐 硕,谷良贤(378)

捆绑火箭超静定连接结构参数化建模与优化 ..... 蒋国庆,陈万华,王元兴(384)

富氧补燃循环液氧煤油发动机深度推力调节方案对比分析 ..... 王海燕,邢理想,高玉闪,陈 文(389)

基于 Modelica 的载人航天器多学科集成建模仿真 ..... 宋 研,邢 涛,巩朝阳(397)

一种微重力下洗衣装置的设计与研究 ..... 汤凯利,张 华,邓德喜,章松发(403)

### 综述

5XXX 系铝镁合金的研究进展 ..... 蒋靖宇,赖松柏,路丽英,方 杰,刘 刚,孟 松,姜 锋(411)

# MANNED SPACEFLIGHT

Vol.25 No.3 (Sum 89) 2019

## CONTENTS

### TOP FORUM

Lunar Construction: Challenges and Research Progresses .....  
..... DING Lieyun, XU Jie, LUO Hanbin, CAI Lixiong (277)

### BASIC RESEARCH

Numerical Simulation on Bubble Dynamic Characteristics inside Liquid Hydrogen Pipeline under Varied Space Gravity Environments .....  
..... WANG Lei, LI Jiangdao, ZHUAN Rui, WANG Jiaojiao, YAN Tian, LI Yanzhong (286)

CFD Numerical Simulation of Fluctuating Pressure Between Booster's Nosecone and Core Stage in Transonic Flow Field ..... SHEN Dan, SU Hong, XU Shanshu (293)

Rigid-Flexible Coupling Analysis of Roller Dynamic Characteristics in Space Rotary Support Mechanism ...  
..... JIANG Guobao, YANG Decai, MENG Fanming (299)

Metabonomics Analysis of *Candida Albicans* Carried by SJ-10 Satellite .....  
..... ZHAO Guangxian, WANG Jiaping, LIU Yu, GAO Jianyi, XIN Bingmu, WANG Heng, LI Yongzhi (308)

Research on Kinematic Characteristics of Joints in Lower Limb during Various Gaits under Different Simulated Gravities ..... LUO Shiyao, YANG Hongrui, SHANG Kun (316)

Computational and Experimental Study on Transpiration Heat-protection Effects in High Speed Reentry Vehicles ..... LU Xueling, MENG Xihui, REN Shujie, ZHANG Qingbing, ZHANG Bo, YAO Jun, GUO Jin, HUANG Haiming, PENG Jinlong, ZHOU Kai (324)

Comparison of Surface Echo Processing Algorithms and Analysis of Improved OCOG Algorithm .....  
..... DING Kaisheng, SUN Wu, XU Qiufeng, WU Kun (332)

Analysis of Thermal Expansion Instability in Plasma Torch Arc Discharge .....  
..... REN Qiongying, ZHAO Jingjing, DING Liang, ZHENG Huiqi, TANG Zhenyu, ZHAO Hua (340)

..... REN Qiongying, ZHAO Jingjing, DING Liang, ZHENG Huiqi, TANG Zhenyu, ZHAO Hua (340)

### ENGINEERING TECHNOLOGY

Kinematic Modeling and Analysis of Soft Inflatable Manipulator for On-orbit Servicing .....  
..... LIU Hongwei, ZHANG Xiang, HUANG Yiyong, CHEN Xiaoqian (347)

Monitoring of Low-velocity Impact Damage in Composite Structures Based on Carbon Nanotubes' Buckypaper Sensors ..... LU Shaowei, DU Kai, WANG Xiaoqian (355)

A Homing Guidance Method based on Hohmann Optimal Rendezvous .....  
..... CHEN Changqing, XIE Yongchun, AN Siying (362)

Stability Analysis of POGO Vibration Considering Multiple Parameter Variations .....  
..... ZHOU Xingguang, SUN Bing (367)

Thermal Design and Analysis of Space Manipulator Joint .....  
..... LIU Chunlong, GUO Liang, HU Richa, ZHANG Xusheng, HUANG Yong, WU Qingwen, SHI Shicai (372)

Overall Design and Analysis of Rocket based Combined Cycle Powered Launch Vehicle .....  
..... CHEN Bing, GONG Chunlin, TANG Shuo, GU Liangxian (378)

Parameterized Modeling and Optimization of Statically Indeterminate Structure in Strap-on Launch Vehicle .....  
..... JIANG Guoqing, CHEN Wanhua, WANG Yuanxing (384)

Comparison of Deep Thrust Throttling Schemes of Oxidizer-rich Gas Staged Combustion Liquid Oxidizer/Kerosene Engine ..... WANG Haiyan, XING Lixiang, GAO Yushan, CHEN Wen (389)

Multi-disciplinary Integrated Modeling and Simulation of Manned Spacecraft Based on Modelica .....  
..... SONG Yan, XING Tao, GONG Chaoyang (397)

Design and Research of a Washing Device Used in Microgravity .....  
..... TANG Kaili, ZHANG Hua, DENG Dexi, ZHANG Songfa (403)

### REVIEW

Research Progress of 5XXX Series Al-Mg Alloy .....  
..... JIANG Jingyu, LAI Songbai, LU Liying, FANG Jie, LIU Gang, MENG Song, JIANG Feng (411)