

深空探测学报(中英文)(双月刊)

第9卷 第2期 2022年4月

目次

专题：月球水冰采样探测技术研究

(主持人：姜生元 教授，哈尔滨工业大学)

- 月球极区水冰采样探测技术综述 季节，张伟伟，杨旭，等 (101)
- 动能侵彻式星壤物性原位触探技术研究进展 姜生元，张伟伟，杨宇彬，等 (114)
- 极区月壤和水冰形成演化机制及物理特性研究 李雄耀，魏广飞，曾小家，等 (123)
- 月壤水冰组构模拟及力学特性测试分析 刘君巍，汪恩良，田野，等 (134)
- 侵彻式月壤探测地面模拟试验研究 孙森，张鸿宇，迟润强，等 (141)
- 月壤水冰模拟样本 SHPB 试验及反射波特异性分析 肖俊孝，庞宝君，唐钧跃，等 (150)
- 双体振贯采样磁力驱动式月壤采样器设计 孙凤，霍晓文，茅冒，等 (157)
- 月壤微量采样器设计与试验验证 张志恒，唐钧跃，张伟伟，等 (165)

研究论文

- 月面表层无人采样控制技术 张宽，于天一，胡晓东，等 (173)
- “嫦娥五号”发射及入轨段 X 频段测控任务设计 李海涛，程承，黄磊，等 (183)
- 月球采样返回飞控任务多目标协同规划设计 彭德云，谢剑锋，赵凤才，等 (191)
- “祝融号”火星车立体视觉算法并行设计与实现 毛晓艳，苗志富，陈建新，等 (202)
- “天问一号”近火飞越应急轨控策略设计方法 梁伟光，张宇，张尧 (211)
- 基于 ANCF 的薄膜太阳帆自旋展开动力学模拟 薛鹏聪，刘铖，水小平 (217)
- 星载等离子体探测器回波的模拟研究 肖雄，姜春华，杨国斌，等 (230)

专栏主持人简介



姜生元，哈尔滨工业大学长聘教授、博士生导师，长期开展星球采样探测、星表智能作业机器人、宇航空间机构及控制领域的前沿技术与航天应用研究。国家“万人计划”科技创新领军人才、科技部重点领域创新团队负责人。获全国优秀教师、高等学校省级教学名师、探月工程三期关键技术攻关先进个人等荣誉称号。哈尔滨工业大学机器人技术与系统国家重点实验室、宇航空间机构及控制技术国防重点学科实验室骨干教师。参与完成了“嫦娥五号”月面采样封装关键技术攻关和月面钻取采样装置研制、“玉兔号”月球车及“祝融号”火星车转移机构研制等任务，目前正在开展月壤水冰高拟实度模拟及其定量采样和就位探测等研究工作。

Journal of Deep Space Exploration

Vol. 9 No. 2 (April, 2022)

CONTENTS

Topic: Sampling and Detection Technology of Icy Lunar Regolith

(Guest Editor: Professor JIANG Shengyuan, Harbin Institute of Technology)

Overview of Water Ice Sampling and Detection Techniques in the Lunar Polar Region	JI Jie, ZHANG Weiwei, YANG Xu, et al (101)
Research Progress of Penetration and In-Situ Detection of Planetary Regolith Physical Properties	JIANG Shengyuan, ZHANG Weiwei, YANG Yubin, et al (114)
Review of the Lunar Regolith and Water Ice on the Poles of the Moon	LI Xiongyao, WEI Guangfei, ZENG Xiaojia, et al (123)
Fabric Simulation and Mechanical Characteristics Test and Analysis of Icy Lunar Regolith	LIU Junwei, WANG Enliang, TIAN Ye, et al (134)
Ground Simulation Test of Penetrator for Lunar Soil Exploration	SUN Miao, ZHANG Hongyu, CHI Runqiang, et al (141)
SHPB Test of Lunar Water Ice Simulant and Analysis of Reflected Wave Characteristics	XIAO Junxiao, PANG Baojun, TANG Junyue, et al (150)
Design of Double-Body Vibration Penetration Lunar Soil Sampler by Magnetic Driven	SUN Feng, HUO Xiaowen, MAO Mao, et al (157)
Micro Quantitative Sampler for Lunar Regolith: Design and Validation	ZHANG Zhiheng, TANG Junyue, ZHANG Weiwei, et al (165)

Research Papers

Control Technology for Unmanned Sampling of Lunar Surface	ZHANG Kuan, YU Tianyi, HU Xiaodong, et al (173)
X-Band TT&C Design in Launch and Early Orbit Phase for Chang'E-5	LI Haitao, CHENG Cheng, HUANG Lei, et al (183)
Collaborative Planning Design of Multi-Targets for Lunar Sampling Return Flight Control Task	PENG Deyun, XIE Jianfeng, ZHAO Fengcai, et al (191)
Parallel Design and Implementation of Stereo Vision Algorithm of Zhurong Mars Rover	MAO Xiaoyan, MIAO Zhifu, CHEN Jianxin, et al (202)
Design Method of Emergency Orbit Control Strategy for Tianwen-1's Mars Flyby	LIANG Weiguang, ZHANG Yu, ZHANG Yao (211)
Spin Deployment Dynamics Simulation of Membrane Solar Sail Based on ANCF	XUE Pengcong, LIU Cheng, SHUI Xiaoping (217)
Simulation Study on Echo of Earth Plasma Layer Detector	XIAO Xiong, JIANG Chunhua, YANG Guobin, et al (230)

Guest Editor Introduction

Jiang Shengyuan is a tenured professor and doctoral supervisor of Harbin Institute of Technology. Long-term research fields are on cutting-edge technologies and aerospace applications in the of planetary sampling and exploration, space agency and control intelligent star catalog operation robot. He is a leading talent in science and technology innovation under the national "ten thousand talents program" and the head of the innovation team in key areas of the ministry of science and technology. He has won the honorary titles of national outstanding teacher, provincial teaching teacher of higher education institutions, and advanced individual of key technology research in phase III of the lunar exploration project. He is the backbone teacher of the state key laboratory of robotics and system, and the national defense key discipline laboratory of research center of aerospace mechanism and control of harbin institute of technology. He participated in the completion of the key technology research on the Chang'E-5 lunar subsurface sampling and packaging, the development of the lunar subsurface drilling and sampling device, the development of the Yutu lunar rover and the Zhurong Mars rover transfer mechanism. At present, research work such as simulation of icy lunar regolith high quasi-solidity, quantitative sampling and in-situ detection is being carried out.