

Yifeng Ma

✉ yifengma728@gmail.com ☎ (+86) 17709274578

EDUCATION

School of Astronautics, Northwestern Polytechnical University

Xi'an, China

Master of Aeronautical and Astronautical Science and Technology

Sep 2022 - Apr 2025 (expected)

– GPA: 3.4/4.0

– Rank: 8/61

School of Astronautics, Northwestern Polytechnical University

Xi'an, China

Bachelor of Aerospace Engineering

Sep 2018 - Jun 2022

– GPA: 3.77/4.0

– Rank: 1/42

RESEARCH EXPERIENCE

Game Theory based Control Method for Multi-Agent Systems

Sep 2022 - Present

- Aimed to explore in depth the interactions among agents in a multi-agent system, and then to design controllers by combining data-driven approach, game theory and formation control method, enhancing the capability of multi-agent systems.
- Developed a pursuit-evasion game to obtain the trajectory of the multi-agent system in the face of a dynamic target, and designed a robust adaptive control with artificial potential field to minimize tracking errors and maintain specific configurations.
- Proposed a novel formation control scheme that integrates data-driven approaches for modeling agent interactions and cooperative game frameworks for controlling satellites based on their coupled relationship.
- Published one journal article and one conference article by applying the proposed algorithm to tethered space net robot, and wrote a grant proposal by extending the proposed algorithm to satellite cluster.

Motion Planning and Control for Multi-UAV Cooperative Transportation

Apr 2020 - Sep 2022

- Aimed to design motion planning approaches and formation control schemes for multiple UAVs, enabling them to collaborate in transporting payloads via tethers.
- Investigated system dynamics model to reduce planning variables and expand the motion range of each UAV, then proposed a novel path planning algorithm to obtain smooth, collision-avoidance trajectories of UAVs for cooperative transportation.
- Examined reinforcement learning based path planning scheme as a local planner to handle dynamic environmental changes, and proposed an intelligent fault-tolerant control algorithm based on deep deterministic policy gradient algorithm to address the case of actuator failure.

PROJECT EXPERIENCE

Configuration Planning and Control for Tethered Space Net Robot

Jun 2023 - Present

- Aimed to demonstrate the feasibility of capturing space debris using tethered space net robot in engineering practice, and to construct a high-precision simulation software system.
- Developed the orbit interception strategy and unfolding control scheme for each satellite in TSNR according to fuel consumption, location error and actuator capability, to meet real-world engineering conditions.
- Designed a cross-platform based high-fidelity simulation system, significantly enhancing the simulation efficiency of TSNR and making it more in tune with the real world.
- Analysed the feasibility of the technical route in practical engineering and prepared the project application.

Ground-based Air Bearing Platform for Satellite Simulation

Oct 2021 - Jun 2023

- Aimed to build a ground-based experimental system for a variety of satellite objects, such as single satellite, tethered space robot, triangle tethered formation system, etc., to further validate the control algorithms proposed by the group.

- Designed a measuring system for the air bearing table, a control system for satellite simulators, and a tether stabilization release and recovery control system, completing serial communications between different ground experimental systems.
- Conducted ground experiments to validate various formation control schemes of space rigid-flexible robots.

PUBLICATIONS

- 1) **Yifeng Ma**, Yizhai Zhang, Panfeng Huang, Ya Liu, and Fan Zhang
Game theory based finite-time formation control using artificial potentials for tethered space net robot
Chinese Journal of Aeronautics, Apr. 2024. <https://doi.org/10.1016/j.cja.2024.04.011>. IF: 5.7, Rank: Q1.
- 2) **Yifeng Ma**, Yizhai Zhang, Panfeng Huang, Ya Liu, and Fan Zhang
Cooperative game theory based formation control for tethered space net robot
The Seventh International Conference on Tethers in Space (ICTiS). Toronto, Canada. 2024.
- 3) **Yifeng Ma**, Yizhai Zhang, Panfeng Huang, Ya Liu, and Fan Zhang
An active energy management distributed formation control for tethered space net robot via cooperative game theory (Under Review)
Acta Astronautica, 2024. IF: 3.1, Rank: Q2.
- 4) Ao Jin, Fan Zhang, Ganghui Shen, **Yifeng Ma**, and Panfeng Huang
A learning-based scheme for safe deployment of tethered space robot (Accepted)
IEEE Transactions on Aerospace and Electronic Systems, 2024. IF: 4.4, Rank: Q1.
Contribution: Data Collection, Simulation.

AWARDS & HONORS

Postgraduate Stage

from Northwestern Polytechnical University

- The First Price Scholarship, 2023
- Outstanding Graduate Students, 2023

Undergraduate Stage

from Northwestern Polytechnical University

- Outstanding Graduation Projects, 2022
- Outstanding Graduates, 2022
- Outstanding Students, 2019-2021
- Aviation Industry Scholarships, 2020
- National Scholarships, 2019

SKILLS

Control Theory	Differential Game Control, Model Predictive Control, Sliding Mode Control
Learning Theory	Koopman Operator, Deep Neural Network, Reinforcement Learning
Programming	Matlab, Python, C++
Software	STK, MuJoCo
Languages	Mandarin (Native), English (IELTS - 7)

INTERESTS

Music	Guitar, Bass (member of a band)
Sport	Badminton (play twice a week)
Other	Painting