Rui Zhang

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37th Xueyuan Road, Haidian District, Beijing, China

EDUCATION

Beihang University Beijing, China
Master of Engineering in Aerospace Science and Technology; GPA: 3.65/4 *Sep 2017 - Jan 2020*

Supervisor: Prof. Chao Han

Thesis: Research on Orbit Determination Based on Spaceborne Accelerometer

Core Courses: Matrix Theory(85), Modern Control Theory(92), Robust Control Theory and Application(99), Advanced Space Dynamics and Control(90), Space Guidance and Control Experiment(94), Space Mission Analysis and System Design(93)

Beihang University Beijing, China
Bachelor of Engineering in Flight Vehicle Design and Engineering; GPA: 3.70/4 *Sep 2013 - Jul 2017*

Thesis: Research on the Low-thrust Optimal Orbital Transfer Characteristics from GTO to GEO

Core Courses: Calculus(90), Linear Algebra(83), Physics(90), Digital Circuits(96), Analog Circuits(94), Automatic Control Theory(92), Theoretical Mechanics(84), Mechanical Principle(94), Mechanical Design(87), Aerodynamics(97), Flight Dynamics(92), Attitude and Orbital Dynamics(86)

PUBLICATION

- **Rui Zhang**, Chao Han, Xiucong Sun, and Zheng Qi. Initial Orbit Determination from Atmospheric Drag Direction [J]. *Journal of Guidance, Control, and Dynamics*, 2019. DOI: 10.2514/1.G004530
- **Rui Zhang**, Yuanjin Yu, Chao Han, and Zhaohua Yang. An anti-saturation steering law for Three Dimensional Magnetically Suspended Wheel cluster with angle constraint [J]. *Acta Astronautica*, 2018, 151: 467-474. DOI: 10.1016/j.actaastro.2018.06.039
- **Rui Zhang**, Fei Xu, Chao Han, and Xiucong Sun. Low-earth orbit determination based on atmospheric drag measurements [C], 2018 AAS/AIAA Astrodynamics Specialist Conference, Snowbird, Utah, Aug 19-23, 2018. EI Accession No. 20193007226973
- **Rui Zhang**, Ran Zhang, and Chao Han. Analysis of fuel-optimal orbital transfer to geosynchronous orbit using electric propulsion [C], 4th IAA/AAS Conference on Dynamics, Control and Space Systems, Changsha, Hunan, China, May 21-23, 2018. EI Accession No. 20185206294641
- Xinwei Wang, Chao Han, **Rui Zhang** and Yi Gu. Scheduling multiple agile Earth observation satellites for oversubscribed targets using complex networks theory [J]. *IEEE Access*, 2019. DOI: 10.1109/ACCESS.2019.2925704

RESEARCH

Study on the Wind Field and Density Inversion Technique of Mars Upper Atmosphere Based on Spherical Spacecraft

Research Assistant *Apr 2018 - Present*

Supervisor: Prof. Chao Han

Sponsor: The Foundation of Key Laboratory of National Defense Science and Technology

- Proposed a novel initial orbit determination method for low-earth orbit satellite's autonomous navigation and designed a two-layer iteration algorithm by using Newton Iteration Method
- Constructed the observation model of accelerometer. Derived the partial derivative matrix which is used in Newton method. Conducted error covariance analysis of the observation system. Demonstrated the accuracy and efficiency of the numerical calculation process and conducted the orbit determination process of real satellite by using Matlab. Improved the orbit determination accuracy by using least square estimation method. Achieved the positioning accuracy of tens of kilometers

High Stability Attitude Control Method of Spacecraft Based on Active Shaft Deflection of Magnetically Suspended Flywheel

Research Assistant *Nov 2016 - Aug 2018*

Supervisor: Prof. Chao Han

Sponsor: The National Natural Science Foundation of China

- Studied the basic dynamic characteristics of Magnetically Suspended Gyrowheel and investigated different kinds of gyro/flywheel steering laws. Designed a novel anti-saturation weighted pseudo-inverse steering law for Three-dimensional Magnetically Suspended Gyrowheel.
- Established the dynamic model of satellite and gyrowheels and tested the law with numerical simulations by using Simulink. Analyzed the effectiveness of the steering law.

Research and Simulation of Autonomous Control Method of High Orbit Satellite Based on Electric Propulsion

Research Assistant *Sep 2016 - May 2018*

Supervisor: Prof. Chao Han

Sponsor: Scientific Research Projects Supported by Beijing Institute of Control Engineering

- Investigated on the algorithms of solving optimal control problems. Ultilized cubature Kalman filter (CKF) parameter estimation algorithm to solve the two-point boundary value problem (TPBVP) of differential equations
- Conducted the numerical simulation using Matlab and analyzed the time optimal control problem and the fuel optimal control problem. Provided specific control time sequence for satellite orbital transfer from GTO to GEO and a series of engineering instructions for the launch of electric propulsion satellite

HONORS & AWARDS

- **Top Ten Postgraduate Students** of Beihang University (Top 0.07%) Jun 2019
- **National Scholarship of China** (Top 1.5%) Oct 2018
- **National Encouragement Scholarship of China** (Top 3%, twice) Dec 2014 & Dec 2015
- **Excellent Academic Paper Award** of Beihang University Jun 2019
- **Merit Student** of Beihang University Nov 2018
- **Outstanding Volunteer** of School of Astronautics, Beihang University Jul 2018
- **Postgraduate Freshmen Scholarship** of Beihang University (Top 5%) Sep 2017
- **Outstanding Graduate Student of Beijing City** (Top 5%, twice) Jul 2017 & Jan 2020
- **First-class Academic Scholarship** of Beihang University (Top 20%, three times) 2017, 2018 & 2019
- **Meritorious Winner** of COMAP's Mathematical Contest in Modeling (MCM) (Top 13%) Apr 2016
- **Second prize** in the 25th "Feng Ru" Cup Student Science and Technology Works Competition of Beihang University May 2015

SKILLS

- **Languages**: English (Fluent, IELTS: 6.5)
- **Programming Languages**: C/C++, Matlab/Simulink, Python
- **Professional Softwares**: Latex, SourceTree, Adobe Illustrator, Microsoft Office