Iosto Fodde

PostDoc Researcher - DART lab - Politecnico di Milano

@ iostofodde@gmail.com +31613922709 Milan, Italy orcid.org/0000-0002-7227-5922

Formal Education/Degree

Master of Science in Spaceflight

Delft University of Technology

2016–2018 Delft, The Netherlands

- Master Thesis: Optimal Trajectory Design for the Aerogravity Assist.

Bachelor of Science in Astrophysics

Leiden University

2013–2016 Leiden, The Netherlands

Experience

PostDoc Researcher

Politecnico di Milano

September 2023 - Milan, Italy

- Main topic: developing data-driven techniques to discover the large scale dynamics of rubble pile asteroids.
- Developing the data pipeline for the NavCam of the Milani CubeSat to the Didymos binary asteroid system.
- Helping in the development of the RAMSES mission proposal to asteroid Apophis.

PhD Researcher

University of Strathclyde

September 2020 - September 2023 Glasgow, UK

- Research project together with ESA and Deimos under the Open Space Initiative Platform.
- Main topic: application of efficient uncertainty propagation techniques to the GNC design and mission analysis of asteroid missions.
- Focus on ESA's Hera mission to binary asteroid Didymos, also as a member of one of the scientific working groups.

Hera Visiting Researcher

ESTEC, European Space Agency

Oct 2022 - Apr 2023 Noordwijk, The Netherlands

- Working with the Hera team at ESTEC on the design of the very-close fly-bys.
- Application of the techniques developed during my PhD to develop robust trajectories and include the navigation and control system in the design process.
- Joining meetings and testing activities to learn more about the mission design process.

AOCS Engineer

AAC Hyperion

Feb 2019 - Sep 2020 Delft, The Netherlands

Areas of Interest

- Astrodynamics;
- Guidance, Navigation, and Control;
- Space Mission Design;
- Planetary Science;

Complementary Education

Summer School

CELTA-Cortina ASI

August 2022 Inverness/Isle of Skye, UK

- Main topic: Dynamics of Exoplanetary and Solar System Bodies.
- Various courses and workshops on this topic from leading experts in the field.

Caltech Space Challenge

Caltech, NASA JPL

March 2022 Los Angeles, USA

- Design of sample return mission to Titan, reviewed by panel of experts from industry and academia.
- Main responsibilities were landing on Titan, orbital design, and sample return.

Summer School

European Space Agency

July 2018 Alpbach, Austria

- Work with a group of 15 students to design an asteroid sample return mission.
- Main responsibilities were trajectory design, GNC system design, and the presentation of the technical case to the jury.

Languages

English ●●●●●

Dutch ●●●●●

Italian ●●●○○

French ●●○○○

- Designer of the attitude and orbital determination and control system of various CubeSat missions.
- Developing of high level sensor fusion and filtering algorithms. Synthesis of controllers which are capable of coping with flexible appendages and fuel slosh.
- Implementation of algorithms on embedded systems and developing of software for the sensors and actuators.

Visiting Scholar

University of Colorado

Aug 2017 - Dec 2017 | Boulder, CO, USA

- Worked on an analytical model for the attitude dynamics of flexible objects (e.g. HAMR space debris and solar panels) in orbit using Kane's method.
- Contributed to a full 6 DOF astrodynamics simulator, written in C++ and Python.
- Done at the Autonomous Vehicle Systems Laboratory, under the supervision of Prof. Hanspeter Schaub.

Teaching Assistant

Delft University of technology

Jan 2018 - Sep 2018 | Delft, The Netherlands

- Working on the TU Delft Astrodynamics Toolbox (Tudat), a large software package written in C++, with interfaces to other software packages including Pagmo, Eigen, Boost, Spice, CMake, JSON, and MATLAB.
- Responsible for maintaining and improving the documentation, testing and building of new features, and user support.

Awards

Best Poster Award

CELTA-Cortina ASI Summer School

2022

Three Minute Thesis Overall Winner

University of Strathclyde

2021

University Student Excellence Award

University of Strathclyde

2020

Links

Github Page
`https://github.com/iosto`

Academic Profile
`https://www.researchgate.net/profile/Iosto-Fodde?ev=hdr_xprf`

Publications

Journal Articles

- Fodde, I., Feng, J., Vasile, M., and Gil-Fernández, J. (2023). Design and Analysis of Robust Ballistic Landings on the Secondary of a Binary Asteroid. In-review with Journal of Guidance, Control, and Dynamics
- Fodde, I., Feng, J., Riccardi, A., and Vasile, M. (2023). Robust stability and mission performance of a CubeSat orbiting the didymos binary asteroid system. Acta Astronautica, 203, 577-591. `https://doi.org/10.1016/j.actaastro.2022.12.021`
- Fodde, I., Feng, J., and Vasile, M. (2022). Uncertainty maps for motion around binary asteroids. Celestial Mechanics and Dynamical Astronomy, 134(5), [41]. `https://doi.org/10.1007/s10569-022-10096-2`
- Casini, S., Fodde, I., Monna, B., Cervone, A., and Gill, E. (2020). Novel 3U stand-alone CubeSat architecture for autonomous Near Earth Asteroid fly-by. Aerospace, 8(1), [9]. https://doi.org/10.3390/aerospace8010009

Conference Papers

- Fodde, I., Feng, J., Gil-Fernández, J., and Vasile, M. (2023). Combined Trajectory Design and Navigation Analysis for Hera's Very-Close Flyby of Dimorphos. Paper presented at 74th International Astronautical Congress 2023, Baku, Azerbaijan.
- Fodde, I., Boumchita, W., Kaluthantrige, A., Savitski, V., Feng, J., and Vasile, M. (2023). The LASERS Mission Concept for Active Debris Removal using Laser Ablation by a Swarm of CubeSats. Paper presented at 74th International Astronautical Congress 2023, Baku, Azerbaijan.
- Marlin, T. C., Gentgen, C., Fodde, I., Groshaus, J., Hennig, A., Hudson, B., Lin, A., Pabarcius, L., Smith, E., Vilchis Lagunes, N., Wall, M., Jiang, R., Mahendrakar, T., Shimane, Y., Christuraj, E., and Gammill, M. E. (2022). ORACLE: A sample-return mission to Titan. In ASCEND 2022 [4372] American Institute of Aeronautics and Astronautics Inc. (AIAA). `https://doi.org/10.2514/6.2022-4372`
- Fodde, I., Feng, J., Gil-Fernández, J., and Vasile, M. (2022). Binary asteroid landing trajectory design from a self-stabilized terminator orbit considering parametric uncertainties. Paper presented at 73rd International Astronautical Congress 2022, Paris, France.
- Kaluthantrige, A., Fodde, I., Feng, J., and Gil-Fernández, J. (2022). Autonomous navigation around didymos using CNN-based image processing. Paper presented at AAS/AIAA Astrodynamics Specialist Conference 2022, Charlotte, United States.
- Fodde, I., Feng, J., and Vasile, M. (2022). Landing area analysis for ballistic landing trajectories on the secondary of a binary asteroid. Paper presented at AAS/AIAA Astrodynamics Specialist Conference 2022, Charlotte, United States.

- Fodde, I., Feng, J., and Vasile, M. L. (2022). Robust trajectory design for ballistic landings on Dimorphos. Paper presented at American Institute of Aeronautics and Astronauts SCITECH 2022 Forum, San Diego, United States. https://doi.org/10.2514/6.2022-1476
- Fodde, I., Feng, J., Riccardi, A., and Vasile, M. (2021). Analysis of the robustness and mission performance of a CubeSat orbiting a binary asteroid system. Paper presented at 72nd International Astronautical Congress, Dubai, United Arab Emirates.
- Fodde, I., Feng, J., and Vasile, M. (2021). Uncertainty propagation for orbital motion around an asteroid using generalized intrusive polynomial algebra: application to didymos system. Paper presented at 8th International Conference on Astrodynamics Tools and Techniques.