

## IAF ASTRODYNAMICS COMMITTEE

### 1. Introduction

The Astrodynamics Technical Committee (TC) of the International Astronautical Federation promotes advances in orbital mechanics, attitude dynamics, guidance, navigation and control of single or multi-spacecraft systems as well as space robotics. The Astrodynamics TC was established more than four decades ago and is currently made up of about 30 members from academic and research institutions, industries and space agencies. The Astrodynamics Symposium is coordinated by the TC and conducted annually during the International Astronautical Congress.

### 2. Latest developments

Some of the most recent advances in Astrodynamics involve the application of machine learning and neural networks to a variety of problems: from attitude control of rigid spacecraft and flexible structures to trajectory optimization and small body gravity field estimation. Differential algebra is being employed in the characterization of families of periodic orbits in the three-body problem and in the general context of mission analysis and design.

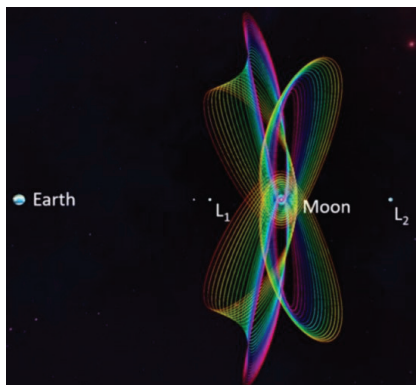


Figure 1: Sample of NRHOs in Earth-Moon space (courtesy of the Planetary Society).

The preparation for the return to the moon (see, e.g., the Artemis program) is reflected in a number of astrodynamics studies related to the cislunar space, including the design of distant retrograde orbits and near rectilinear halo orbits (a subset of the Earth-Moon L1 and L2 orbit families, see Figure 1). The latter is considered in the context of the design of NASA's Gateway mission.

### 3. Action plan for the year

- The 11<sup>th</sup> International Workshop on Satellite Constellations and Formation Flying (IWSCFF 2022) will take place on June 7-10, 2022 at Politecnico di Milano, Milan, Italy. This conference is organized under the auspices of the International Astronautical Federation and gathers researchers from research Institutions, academia and industry to discuss recent advances in the field of astrodynamics applied to satellite constellations, formation flying, and proximity operations.
- The 2022 edition of the John Breakwell Memorial Lecture will be hosted during the Astrodynamics Symposium of the 73<sup>rd</sup> International Astronautical Congress in Paris. This prestigious Lecture was initiated by the late Prof. V.J. Modi of the University of British Columbia in 1991 as a tribute to the late Prof. John V. Breakwell (1917–1991) of Stanford University, who is regarded as an outstanding astrodynamist of the last century. The awardee will be announced prior to the IAC.

### 4. Announcements

- The IAA/AAS SciTech Forum 2022 on Space Flight Mechanics and Space Structures and Materials has been postponed until the end of 2022

- The 5<sup>th</sup> Workshop on Key Topics in Orbit Propagation Applied to Space Situational Awareness (KePASSA) will take place on 22-24 June in Logroño (Spain) (<https://kepassa2022.sciencesconf.org/>)
- The summer school titled “From Stardust to Extrasolar Planets: Dynamics of Exoplanetary and Solar System Bodies” will be held in August 15-27 at Inverness and Sabhal Mòr Ostaig, Isle of Skye, Scotland (more information at <http://www.wolfbane.com/astrocelta/>)
- A Global Networking Forum (GNF) on Space Sustainability has been proposed for the coming IAC2022
- University of Rome Tor Vergata (Italy) will host The Eighth International Meeting on Celestial Mechanics from 5<sup>th</sup> to 9<sup>th</sup> September (<https://www.mat.uniroma2.it/~celmec/celmec8/index.html>)
- The Stardust conference will take place at ESA/ESTEC on 7-11 November 2022. The event will focus on asteroid exploration and space environment management and sustainability (see also <http://www.stardust-network.eu/stardust-reloaded-final-conference/>)
- A special issue of Advances in Space Research will feature contributions on the topic of Space Environment Management and Space Sustainability.