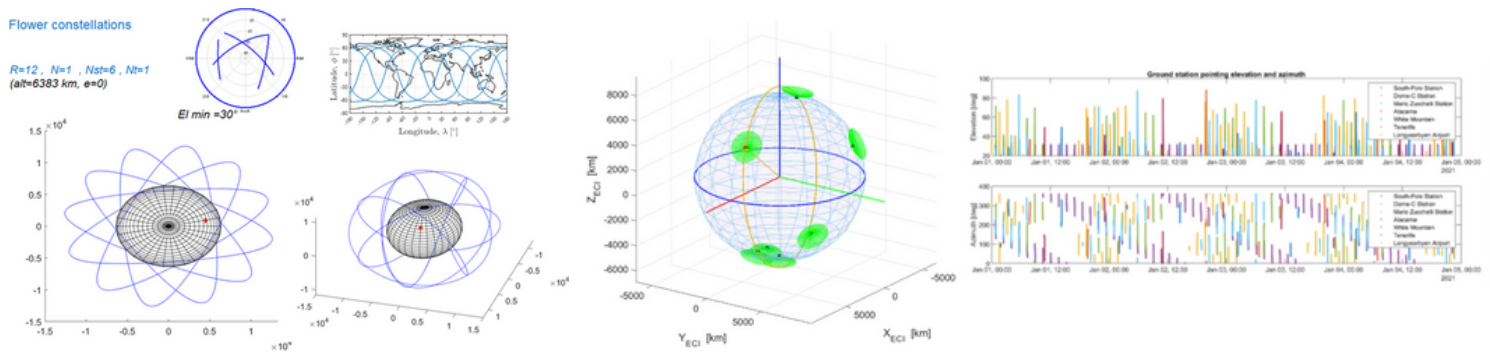


INTRODUCTION TO THE DESIGN OF LEO NANOSATELLITE ORBITS FOR GLOBAL AND LOCAL COVERAGE

This webinar will present the main criteria needed to optimize the design of Low Earth Orbit (LEO) constellations for global and local coverage. It will describe the main drivers in defining constellation architecture and provide mathematical means to implement trade off and optimization studies. Orbital evolution will be analyzed using perturbed two-body Keplerian equations and expressions for repeated ground track and revisit time orbits will be derived. Starting from an overview of constellations for global coverage (Walker and Street of Coverage) the webinar will focus on local coverage patterns using special architectures for regional constellation design (flower constellations) aimed at continuous monitoring of areas of interest. Optimization approaches based on genetic algorithms and particle swarm will be described. Applications of constellations for analysis of dedicated areas (Veneto region) will be presented along with examples of configuration achieving maximized visibility from multiple ground stations.



LEARNING OBJECTIVES

- Classical and perturbed two-body orbital flight dynamics
- Repeated ground track orbits and revisits time calculation
- Global and regional constellation design

Target audience: doctoral students interested in Earth orbit nanosat constellations design, engineers who aspire to a deeper understanding of applied orbital dynamics, technical or non-technical professionals new to the space industry who need an introduction to the problem of orbital design in LEO.

Dates and time: 12 and 13 December 2022, 10:00-12:00 CET

REGISTRATION AND CONTACTS

Course Code: 20221212

This course is part of the 2022 institutional activity for AIDAA members. The registration requires the purchase of one of the packages described here <https://www.aidaa.it/package-list/>, and the completion of the online form available on AIDAA webpage.

Course platform: Webex, a link will be sent via email as the registration is complete. At the end of each course, **attendance certificates** will be sent to participants via email.

For further info, please, contact academy@aidaa.it



SPEAKER

Carlo Bettanini is an Assistant Professor at the University of Padova teaching courses in Aerospace Flight Dynamics to Aerospace Engineering. His research activity is mainly related to the identification of optimal techniques to monitor and reconstruct the dynamic behaviour of flying systems for low and high atmosphere and space applications (mainly drones, stratospheric balloons and nanosatellites) . He has collaborated in the design, construction, testing and qualification of components for numerous scientific missions for Italian and European Space Agency and was program manager of DREAMS (Dust characterisation Risk assessment and Environmental Analyzer on the Martian Surface) instrument of ExoMars 2016 mission. He worked on the design of integrated ground-air-space systems for security, surveillance, and mobility management using optical and radar sensors for Veneto region and is involved in the project "New satellite Generation Components" led by Thales Alenia, working on the design of avionics and trajectory and attitude control optimisation for a Cubesat in LEO orbit dedicated to the calibration of Cosmic Microwave Background ground-based telescopes.

