

## NONLINEAR SPACECRAFT ATTITUDE CONTROL

Spacecraft attitude control laws are often designed using linear control design techniques. As a result, their effectiveness can be guaranteed only for small attitude angles and small angular velocities since in that situation a linear approximation of the attitude equations can be employed. However, there are occasions when the spacecraft motion involves large attitude angles and large angular velocities. For those motions, the full nonlinear attitude equations must be used for evaluating the effectiveness of attitude control laws. In this course, basic results of Lyapunov stability theory will be presented and applied to nonlinear spacecraft attitude control.



### LEARNING OBJECTIVES

- Spacecraft detumbling
- Stability of nonlinear systems
- Lyapunov theorems
- Nonlinear spacecraft attitude stabilization
- La Salle's theorem
- Lyapunov indirect method

**Target audience:** Doctoral students, non-academic professionals, and undergraduate students.

**Dates and time:** 14-15 September 2022, 10:00-12:00 CEST

### REGISTRATION AND CONTACTS

**Course Code:** 20220914

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](mailto:academy@aidaa.it)

### SPEAKER

**Fabio Celani** is an associate professor of flight mechanics at the School of Aerospace Engineering of the Sapienza University of Rome. He received his Laurea degree (summa cum laude) in electronic engineering from the Sapienza University of Rome, and his M.S. and D.Sc. degrees in systems science and mathematics from Washington University in St. Louis, USA. He was a research associate at the Center for Ships and Ocean Structures of the Norwegian University of Science and Technology, Trondheim, Norway, and at the Department of Computer and System Sciences Antonio Ruberti of the Sapienza University of Rome. He held visiting positions at the Mittag-Leffler Institute, Djursholm, Sweden, and at Saveetha Institute of Medical and Technical Sciences, Chennai, India. His current research interests lie in the field of attitude control, spacecraft dynamics, and control, and nonlinear control.

