AIDAA Educational Series and Academy

Nonlinear spacecraft attitude control

11th and 13th November 2024

Spacecraft attitude equations are usually given by nonlinear equations. However, spacecraft attitude control laws are often designed using a linear approximation of those equations about an operating condition. Thus, the effectiveness of the control laws can be guaranteed only for attitude angles and angular velocities close to the operating condition. There are occasions when the spacecraft motion involves attitude angles and angular velocities that are far from the operating condition. For those motions, the full nonlinear attitude equations must be used for evaluating the effectiveness of the control laws. This course presents the design of attitude control laws for two typical spacecraft operations along with basic tools that are useful to validate the design with nonlinear attitude equations.

Learning objectives: Learning control laws for spacecraft detumbling and spacecraft attitude regulation. Learning mathematical tools for validating attitude control laws using nonlinear attitude equations.

Target audience: doctoral and master students, non-academic professionals.

Dates and time: 11th and 13th November 2024 – from 10:00 to 12:00

Speaker

Fabio Celani is an associate professor of flight mechanics at the School of Aerospace Engineering of Sapienza University of Rome. He received his Laurea degree in electronic engineering from 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 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, nonlinear control.

Course platform: Webex, a link will be sent via email as the registration is complete.