



**Politecnico
di Torino**

Dipartimento
di Ingegneria Meccanica
e Aerospaziale



DIMEAS SEMINAR NONLINEAR CONTROL OF PRECISION SPACECRAFT FORMATION FLYING EXPLOITING DYNAMICAL-SYSTEM STRUCTURE

SPEAKER



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**24 September
10:00 a.m.**



**Sala Ferrari, II floor,
DIMEAS – Politecnico di Torino**

Abstract

This seminar focuses on precision formation-flying control of multiple spacecraft using nonlinear control methods that exploit the structure of physical systems.

As an introduction to nonlinear control, the seminar first reviews fundamental concepts of equilibrium stability for nonlinear systems and outlines stability analysis based on Lyapunov methods.

Next, port-Hamiltonian systems are introduced as a generalized framework for describing physical systems, followed by a discussion of stabilization methods that explicitly exploit their underlying mechanical and energy-based structure.

The seminar then presents an application to spacecraft formation-flying control, which the speaker has been investigating toward the realization of next-generation space interferometers.

In particular, an overview of nonlinear control methods for establishing and maintaining desired spacecraft formations will be presented,

taking into account both the nonlinearities and the dynamical structure inherent in the relative orbital dynamics among multiple spacecraft.

BIO

Satoshi SATOH received the B.Sc., M.Sc., and Ph.D. degrees in engineering from Nagoya University, Japan, in 2005, 2007, and 2010, respectively.

He is currently a professor at the Graduate School of Engineering, The University of Osaka, Japan.

From 2010 to 2017, he was an assistant professor at the Faculty of Engineering, Hiroshima University, Japan, and from 2017 to 2022, an associate professor at the Graduate School of Engineering, The University of Osaka.

In 2011, he was a visiting researcher at Radboud University Nijmegen, The Netherlands.

His research interests include spacecraft attitude and orbital control using geometric and energy-based control approaches, as well as nonlinear and stochastic control methods.

He received the Best Paper Award at the 2nd International Symposium on Swarm Behavior and Bio-Inspired Robotics in 2017 and the Best Paper Award at the 10th Asian Control Conference in 2015, among other awards.