AEROSPACE ENGINEERING

Astrodynamics and G&C of Distributed Space Systems

Funded By	Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	This research activity aims at developing new analytical and numerical tools for the dynamic modeling, the analysis and the synthesis of optimal guidance and control strategies for Distributed Space Systems. Broadly defined, those are systems of multiple orbiting spacecraft, flying in a coordinated fashion. Several scenarios will be considered that are of high interest for emerging applications such as in the framework of Orbital Robotics, and On-orbit Servicing, Assembly, and Manufacturing (OSAM) missions. The developed guidance and control strategies will be tested primarily by custom-coded numerical experiments. Furthermore, a possible campaign of experimental testing will be pursued by utilizing on-the-ground hardware-in-the-loop kino-dynamic simulators.
Objectives	First, mathematical models will be developed by adopting modern astrodynamics practices. Second, optimal guidance and control strategies will be developed, based on both an open and a closed loop approach. Preference will be given to methods that have a rigorous analytical base, e.g., in terms of proof of stability and convergence. Concurrently, the limitations of on-board computational capabilities will be considered, in order to obtain algorithms that can be applied for autonomous spacecraft flight. Third, extensive numerical simulations and targeted HIL experiments will be conducted.
Skills and competencies for the development of the activity	The candidate must hold a degree in aerospace engineering. The candidate should have previous experiences in the modeling of space systems, and in the development of guidance and control tools. The candidate should have experience pertaining to coding numerical simulation software, and an interest in developing the capability to perform experimental work. The candidate must have a fluent knowledge of English, in both speaking and writing, and be able to work as a member of a motivated team. The candidate preferably has previous experience of performing research with international research organizations, both in Europe and in USA.