Politecnico di Torino

Dipartimento di Ingegneria Meccanica e Aerospaziale

DIMEAS SEMINAR

ADAPTIVE CONTROL AND CONCURRENT LEARNING FOR FLEXIBLE SPACECRAFT

SPEAKER

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Abstract

A renewed interest in spacecraft with large deployables and on-orbit assembly justifies the interest in better control and estimation techniques. Technology advancements are enabling ambitious missions such as the Near-Earth Asteroid (NEA) Scout, soon to be deployed from SLS, and the AFRL's Space Solar Power Incremental Demonstrations and Research Project (SSPIDR). NEA Scout holds an 86 square meters solar sail, while SSPIDR will be an incrementally assembled structure. Modeling limitations, storage deformations and partial deployments are some of the reasons why a simultaneous attitude control and structural estimation approach is here proposed. In addition, complex systems like the ones described earlier can be only partially verified on the ground, with orbital flight being the very first time there are tested.

This talk introduces the idea of adaptive control with integral concurrent learning to realize orbital attitude control and estimation of structural parameters.

BIO

Dr. Riccardo Bevilacqua is the vice Provost for academic affairs and a Professor of Aerospace Engineering at Embry-Riddle Aeronautical University. He holds a M.Sc. in Aerospace Engineering (2002, cum laude), and a Ph.D. in Applied Mathematics (2007), both from the University of Rome, "Sapienza", Italy. Dr. Bevilacqua is the recipient of several department of defense awards and contracts, among those two DoD young investigator award, and (co)author of more than 170 publications. His research interests focus on spacecraft formation flight, space robotics and spacecraft fragment fly-out predictions. He is an AIAA Associate Fellow, AAS Fellow, Royal Aeronautical Society Fellow, and IAA Member. He is the founder and chair of the IAA conference on Space Situational Awareness.

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