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Author: Mr. Stefano Aliberti
Politecnico di Torino, Italy, stefano.aliberti@polito.it

Dr. Marco Quadrelli
Jet Propulsion Laboratory - California Institute of Technology, United States,
Marco.B.Quadrelli@jpl.nasa.gov
Prof. Marcello Romano
Politecnico di Torino, Italy, marcello.romano@polito.it

# A NOVEL RADAR REMOTE SENSING ORBITING SYSTEM USING TETHERED SATELLITES

**Abstract**

The objective of this paper is to analyze the performance of different concepts of stabilized tether space systems for radar remote sensing applications using different techniques. Specifically, we address the advantages and disadvantages of each configuration, comparing their performance with each other and with the current state of the art of radar remote sensing systems.

First of all, we consider a distributed satellites system in which some of the satellites are offset along the cross-track direction for motion inducted synthetic aperture radar applied to the field of earth observation.

At this point, three different architectures are introduced. The first consists in a cross-track oriented tether satellite system, controlled, and stabilized exploiting the rarefied atmosphere of low Earth orbit in order to keep the formation. The second one involves a linear tether satellite system controlled through gyroscopic stabilization, thanks to which a constant oscillation in the cross-track direction is guaranteed. The last one consists of a cross-track plus along-track tethered system, kept in place thanks to aerodynamic forces.

For these three configurations, their performance for radar remote sensing are analyzed, considering different mission scenarios. Finally, the different cost for maintenance of the three configuration is studied, underling the possible trade-off between performance and cost that characterize these architectures and their application to possible missions.