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SMALL PASSIVE SAR SATELLITES IN A BISTATIC CONSTELLATION, A CASE STUDY AND
APPLICATIONS

Abstract

This paper presents a study on small passive SAR satellites in order to evaluate a potential formation option for a bistatic mission with the Italian SAR mission COSMO-SkyMed. The paper first section discusses the selection of the orbital plane for a small satellite which can prove into favorable observation characteristics for the areas accessed by the bistatic formation. The mission is shaped in a way that a selected area of the globe will be repeatedly observed by the bistatic couple, which offers distinct views carrying independent information that can be extracted from the data. In the second section, specific constraints for the small satellite will be evaluated according to the application needs in a cost-effective trade-off, considering the limited dimensions (e.g. power, antenna allocation, data handling) and life span (maneuvering capabilities) of a small satellite in a very low orbit. The analysis will then extend in the third section to the case of a constellation of small satellites that can receive signal originated by multiple transmitting satellite masters, which encompasses the full COSMO-SkyMed constellation, thus increasing the spectra of capabilities for the bistatic mission. Suitable applications will be addressed in the so configured case-study, such as bistatic target characterization and stereogrammetric imaging. Further potential possibilities will be illustrated under specific assumptions of spacing and position of the passive satellites of the constellation to produce cross-track interferometry and multiple aperture array techniques. Finally the conclusions of the study will be summarized in terms of capabilities and constraints of such a system.