

Performance Analysis of New Types of Reference Targets Based on Spaceborne and Airborne SAR Data

Authors : Y. S. Zhou, C. R. Li, L. L. Tang, C. X. Gao, D. J. Wang, Y. Y. Guo

Abstract : Triangular trihedral corner reflector (CR) has been widely used as point target for synthetic aperture radar (SAR) calibration and image quality assessment. The additional "tip" of the triangular plate does not contribute to the reflector's theoretical RCS and if it interacts with a perfectly reflecting ground plane, it will yield an increase of RCS at the radar bore-sight and decrease the accuracy of SAR calibration and image quality assessment. Regarding this problem, two types of CRs were manufactured. One was the hexagonal trihedral CR. It is a self-illuminating CR with relatively small plate edge length, while large edge length usually introduces unexpected edge diffraction error. The other was the triangular trihedral CR with extended bottom plate which considers the effect of "tip" into the total RCS. In order to assess the performance of the two types of new CRs, flight campaign over the National Calibration and Validation Site for High Resolution Remote Sensors was carried out. Six hexagonal trihedral CRs and two bottom-extended trihedral CRs, as well as several traditional triangular trihedral CRs, were deployed. KOMPSAT-5 X-band SAR image was acquired for the performance analysis of the hexagonal trihedral CRs. C-band airborne SAR images were acquired for the performance analysis of the bottom-extended trihedral CRs. The analysis results showed that the impulse response function of both the hexagonal trihedral CRs and bottom-extended trihedral CRs were much closer to the ideal sinc-function than the traditional triangular trihedral CRs. The flight campaign results validated the advantages of new types of CRs and they might be useful in the future SAR calibration mission.

Keywords : synthetic aperture radar, calibration, corner reflector, KOMPSAT-5

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020