

FIRST TRIALS TO RETRIEVE PERMITTIVITIES FROM DOUBLE BOUNCES IN SAR IMAGES

Steve Tyler^{1,2}, Xavier Dupuis¹, Régis Guinvarc'h², Laetitia Thirion-Lefevre²

¹DEMR, ONERA, Université Paris-Saclay F-91123 Palaiseau – France

²SONDRA, CentraleSupélec, Université Paris-Saclay, F-91190 Gif-sur-Yvette, France

Abstract

The main focus of the work is to solve the inverse scattering problem of a double bounce in a SAR image. We test the applicability of the ratio method developed in SONDRA^[1], which successfully inverts the two permittivities corresponding to the two surfaces involved in a double bounce scattering from a dihedral facing the radar sensor. Since double bounce scattering is predominantly present in SAR images in the vicinity of man-made structures and forest borders it is interesting to survey the possibility of obtaining information about the surfaces perpendicular to the ground, which are not easily interpretable in the imaging geometry. Since the ratio method requires data from two acquisitions with different incidence angles and two polarizations Hh and Vv, we have identified a dataset meeting these conditions from an acquisition campaign done by ONERA^[2]. The dataset which is rare of its kind, had been acquired over Saint Martin de Crau, France. The data had been acquired in a full polarimetric mode at X-band and L-band simultaneously, and on two days corresponding to two incidence angles of 45° and 60°. In X-band, the resolution for these images is 0.20m in range and 0.50m in azimuth, and for L-band, the resolution for these images is 1m in range and 1m in azimuth. We include the preliminary results of the first trials and discuss the initial observations.

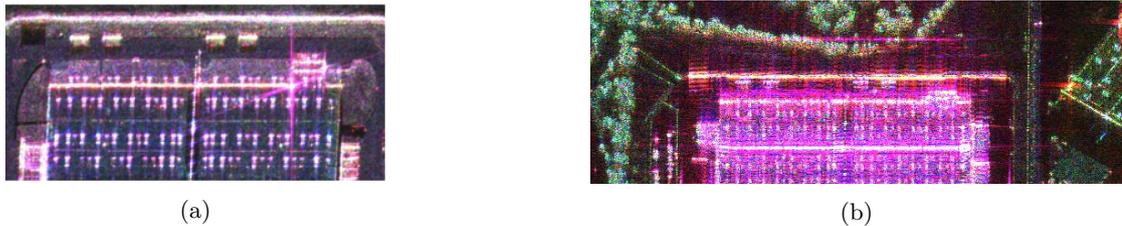


Figure 1: Region of interest (a) X-band, (b) L-band ; Red: Hh, Green: Hv and Blue: Vv

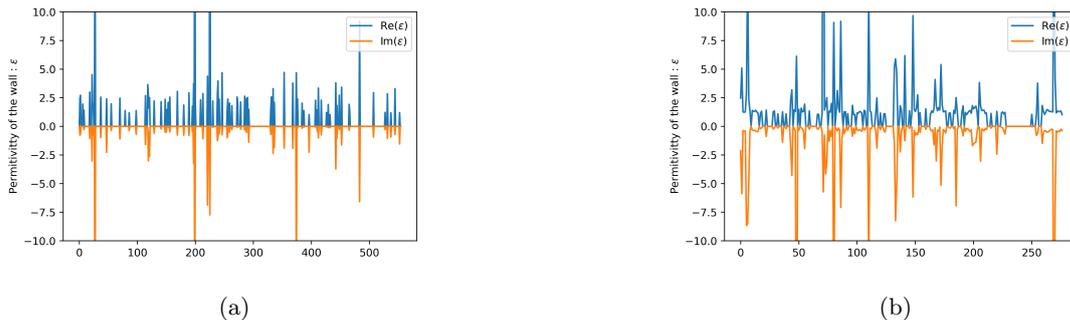


Figure 2: Inversion obtained for : (a) X-band, (b) L-band

Extrema can be observed at some locations on both the real and the corresponding imaginary part of the retrieved permittivity. Hence, they can be speculated to be originating from metallic objects located on the wall. A relatively homogeneous distribution can be observed on the rest of the values.

References

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