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Algorithms for radar image identification and classification

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Abstract

We present and compare two different novel methods for classification of aircraft categories of Inverse Synthetic Aperture Radar (ISAR) images. The first method forms numerical equivalents to shape, size and other aircraft features as critical criteria to constitute the algorithm for their correct classification. The second method compares each ISAR image to unions of images of the different aircraft categories. We computer simulated five different categories of ISAR images and took two more from the internet. ISAR images are constructed based on the Doppler shifts of various parts, caused by the rotation of the aircraft and the radar reflection pulse shape which includes the size or duration of the radar pulse. The proposed classification algorithms were tested on these seven categories. All seven different aircraft models are flying a holding pattern. The aim of both algorithms is to quickly match and determine the similarity of the captured aircraft to the seven different categories where the aircraft is in any position of a prescribed holding pattern. Our experimental results clearly indicate that in most parts of the holding pattern the category of the aircraft can be successfully identified with both proposed methods. The union method shows more successful identification results and is superior to the results we obtained in the first proposed method. © 2010 IEEE.

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