

A ground based circular synthetic aperture radar

ABSTRACT

Detecting on-the-ground objects is a subject of interest for some applications. Typical example is foreign object detection on the airport runway. In response to this demand, a ground-based Circular Synthetic Aperture Radar (CSAR) system is proposed and explained in the paper. In the proposed CSAR, the antennas represent a circular movement trajectory. Wideband Linear Frequency (LFM) chirps were used for transmission. A simulation model for CSAR, based on the Doppler Effect between the radar and object is developed in this paper. In addition, a processing method for object detection using correlation between image data produced by simulation and experimental data is developed. The resultant of the simulated model at each point, which represents the object's behavior in an ideal and clutter-free environment, is used as a template for object detection. Simulation and experimental results demonstrate that the proposed method is well suited in detecting small objects at different positions.

Keyword: Circular synthetic aperture radar (CSAR); Object detection; Small objects