

Development of Circularly Polarized Synthetic Aperture Radar onboard Small Satellite

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Synthetic Aperture Radar (SAR) is a multi purpose sensor that can be operated in all-weather and day-night time. Recently, the SAR sensor is operated in linear polarization (HH, VV and its combination) with limited retrieved information. The characteristics of the conventional SAR sensor is bulky, high power, sensitive to Faraday rotation effect etc. Recently, our laboratory is developing the Circularly Polarized Synthetic Aperture Radar (CP-SAR) onboard small satellite to retrieve the physical information of Earth surface, especially the pre- and post-disaster area in the future. In this research, the CP-SAR sensor is developed to radiate and receive circularly polarized wave. The sensor is designed as a low cost, simple, light, strong, low power or safe energy, low profile configuration to transmit and receive left-handed circular polarization (LHCP) and right-handed circular polarization (RHCP), where the transmission and reception are working in RHCP and RCHP+LCHP, respectively. Then these circularly polarized waves are employed to generate the axial ratio image (ARI). This sensor is not depending to the platform posture, and it is available to avoid the effect of Faraday rotation during the propagation in ionosphere. Therefore, the high precision and low noise image is expected to be obtained by the CP-SAR. The small satellite is planned to launch in 2014 to collect the information of Earth surface. Then the constellation of 5 same satellites are considered to realize the semi real time monitoring in the future, especially for the disaster monitoring.