Abstract

Synthetic Aperture Radar (SAR) is a remote sensing sensor that has the ability to work night and day in all weather conditions, to provide high quality terrain elevation map and to have detail terrain information using polarimetry technique. Due to these various advantages, the demand for employing a SAR sensor onboard a small and low-cost satellite is highly increasing. This paper discusses the study of small SAR sensor onboard a 100 kg satellite class with cost less than 1 billion yen.

Keywords: small SAR sensor, small satellite, SAR antenna, GaN amplifier.

1. Introduction

2. Theory of SAR

3. Research Result

Figure 1 The mass and resolution for stripmap mode of recent SAR system

Figure 2 SAR onboard satellite platform geometry

Figure 3 Relationship between $PT_{ave}$ and $\lambda$.

Figure 4 Relationship between resolution and $\sigma_{NE}$

Figure 5 Amplifier power and efficiency comparison

Figure 6 Concept drawing of 100 kg small satellite

Table 1 Small SAR onboard small satellite specification

Conclusion and Future Research

The usage of high frequency in the SAR system is suitable for small SAR sensor implementation since it gives us the possibility to employ small antenna, SAR sensor with low power requirement and also to obtain better $\sigma_{NE}$ or resolution. In this research, it is planned to develop a low loss passive antenna array without RF devices. A high efficiency transmitter and power-heat issues will also be investigated.

References


2. 100kg級の小型地球観測衛星に搭載するマイクロ波合成開ローレラのシステム検証及び技術開発検討

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Figure 7 The proposed SAR System