

Designing A High Resolution FMCW Radar for Remote Sensing Applications

Hamid Kiumarsi¹, Motoyuki Sato²
 1 Graduate School of Environmental Studies
 2 Center for Northeast Asian Studies
 Kiumarsi@cneas.tohoku.ac.jp

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Abstract

SARs (Synthetic Aperture Radars) are radar sensors that are used to monitor and image the environment. The images created by them have more information compared to the optical ones and are easy to perform further processing. There are many platforms that SARs are housed in, such as satellites, aircrafts or fixed railways on the ground. The latter is called GB-SAR. In the environmental imaging, GB-SAR has many applications such as landslide monitoring or the validation of satellite SAR systems.

Mostly GB-SARs are composed of antennas, a railway, a positioner and a VNA. VNA is a measuring device that is generally used in measuring of parameters in every high frequency system. Due to flexibility of the VNA, wide range of measurements can be done with the VNA based GB-SAR. But it has some drawbacks. In some cases, one system with faster data acquisition and fixed measuring system rather than flexible one is preferred. So, setting the parameters in such a system will not be needed every time.

We aim to develop high resolution radar. Here, the radar resolution is the minimum distance that two targets can have and still can be resolved as two separate targets with radar. One of the applications of high resolution radars can be monitoring the small changes (in the order of few cms) in paddy fields or leaves of trees that can not be monitored with current satellite SARs. A VNA based GB-SAR is shown in Fig. 1 and VNA in this figure is encircled with dotted line. Our aim is to design a FMCW (Frequency Modulated Continuous Wave) radar prototype and replace it with the VNA. Fig. 2 gives the impression of how such a radar will look like.

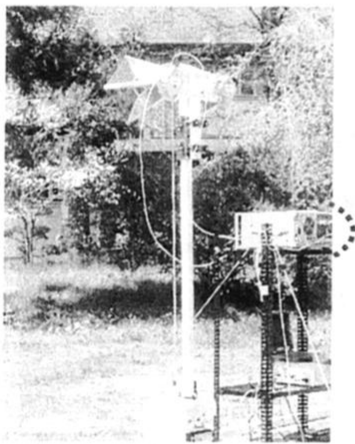


Fig. 1 VNA based GB-SAR

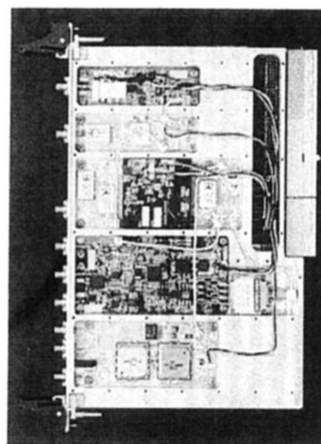


Fig. 2 A radar prototype for GB-SAR