The research of terahertz wave detector for atmospheric particles

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Abstract- The parameters of atmospheric particles in clouds can be achieved by space terahertz detectors. In order to get more experimental data, the 220GHz imaging system is designed and realized with stepped frequency coherence technology, then some experiments have been done in a foggy room, which show there is a good sensitivity.

***Key Words*—220GHz, cloud particles, foggy room**

I. Introduction

TERAHERTZ imaging technology is actively being developed in response to the demand for space applications in recent years. The Cloudsat radar of NASA and The Earth-CARE radar of ESA both used the working frequency of 94 GHz[1], and a 215GHz pulse radar was designed to detect atmospheric particles in the USA[2].

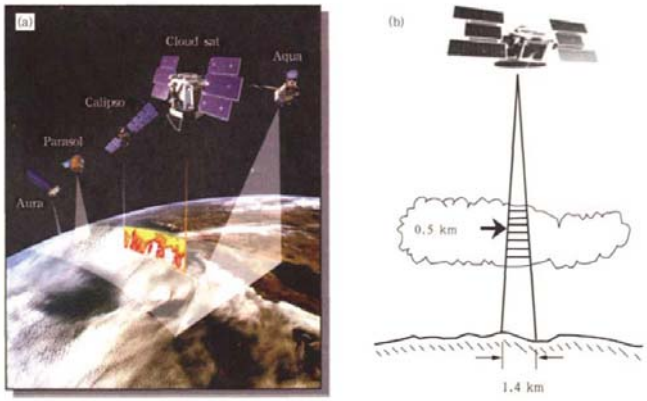

Fig. 1. 94GHz Cloudsat radar diagram

II. The Design of 220GHz System

The block diagram of the terahertz radar is shown in Fig 1. The 220GHz stepped frequency pulse imaging system consists of five modules, signal sources, front-end, IF module, signal process and antenna.

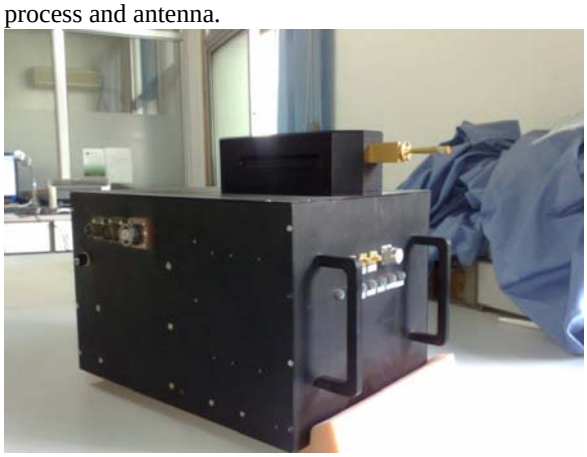

Fig. 2. 220GHz Cloudsat radar diagram

III. Experiments And Results

The experiments were done in a foggy room.

Fig. 4. Foggy room experiments

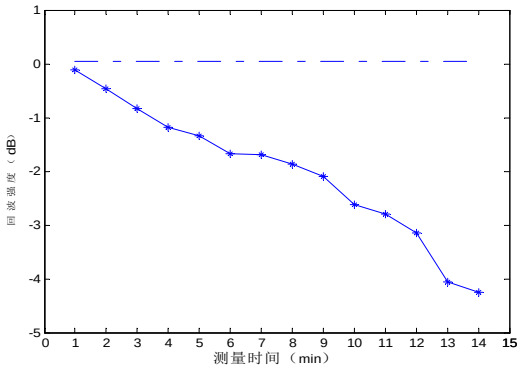

Fig.5. Experiments results

Reference :

[1] Orbit and Transmit Characteristics of the CloudSatCloud Profiling Radar (CPR), Jet Propulsion Laborotary, California Institute of Technology,2004 .

[2] Design and Performace of a 215GHz pulsed radar system, IEEE Transactions and Microwave Theory and Techniques,Vol36,No.6,1988, pp994-1001