Small synthetic aperture radar satellite

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Abstract

We are goint to develop synthetic aperture radar system that can be onboard on a 100kg class satellite and to verify it on ground. Conventionally radar observations have required large or medium satellite with 500-1000kg mass. Our research and development may change earth observation drastically.

http://www.jst.go.jp/impact/en/program/13.html

Reasons for using of JSS2

We utilize super-computer for design of slot array antennas dedicated for small synthetic aperture radar. Design of slot array antenna requires a super-computer that is provided with high speed and large memory.

Achievements of the Year

We performed simulation for 4 panels antenna and antenna network feeder system for antenna panels array. Here the, we simplified the simulation of network feeder system for 7 antenna panels array with 3.5 antenna panels array simulation.　The simulation results are shown in Fig.1. In this simulation, in-phase and uniform excitation to the parallel-plate antenna are expected. Furthermore, the simulation results which are showing performance of each antenna panels is shown in Fig.2.

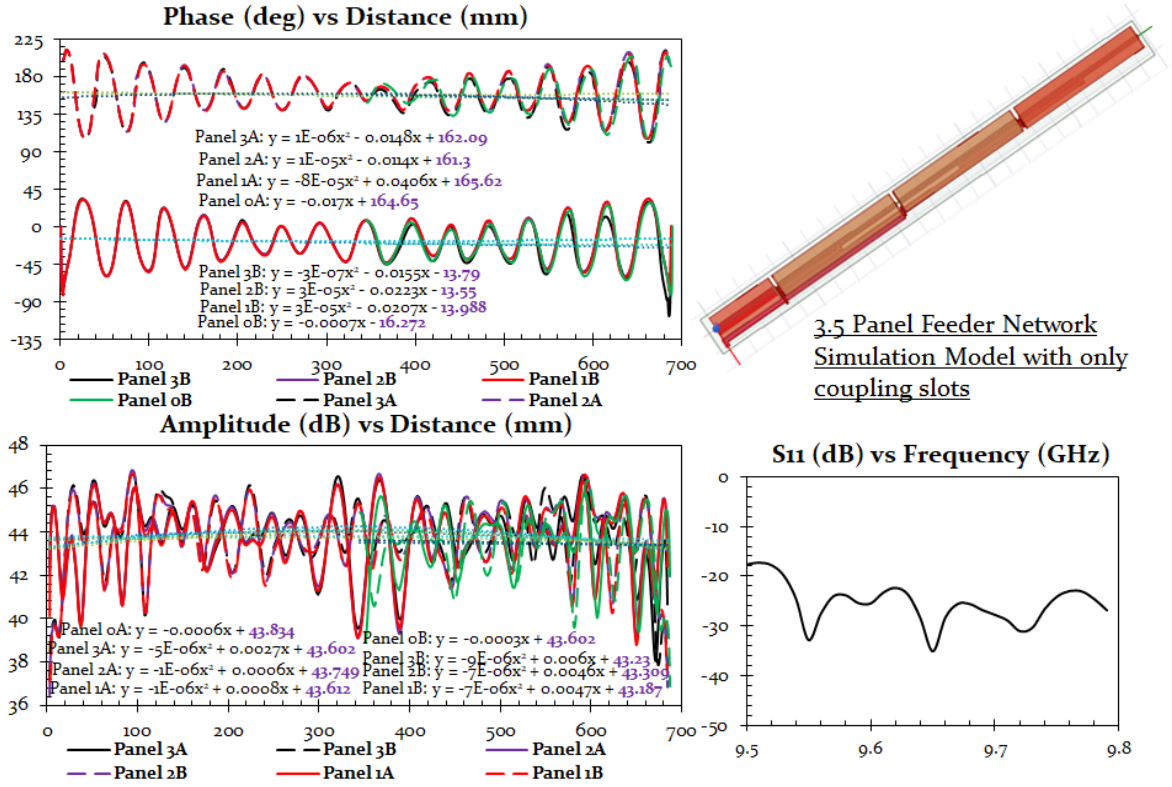

Fig.1 Tournament feeder network design for 7 antenna panels array.

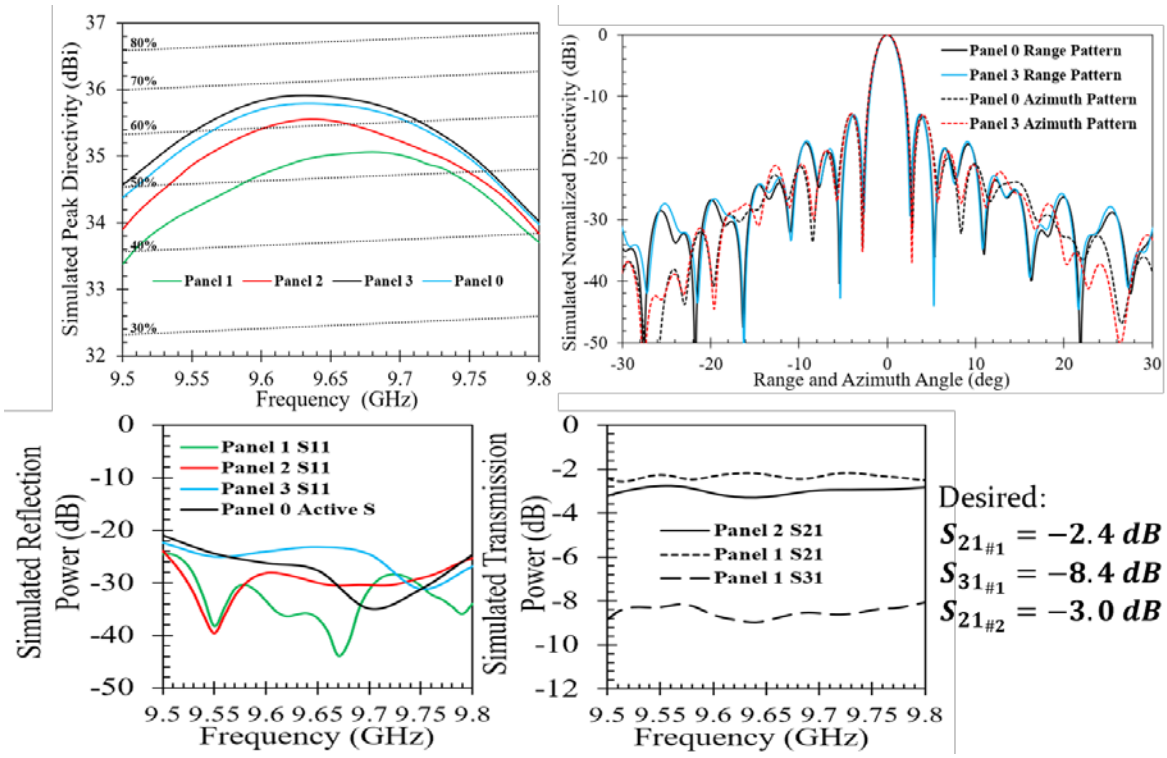

Fig.2 Antenna Panels simulation results.

Publications

- Peer-reviewed papers

1) B. Pyne, P.R. Akbar, V. Ravindra, H. Saito, J. Hirokawa, T. Fukami, "Slot-Array Antenna Feeder Network for Space-borne X-band Synthetic Aperture Radar", submitted to the Proceedings of IEEE Transactions on Antennas and Propagation, under review as of March 12, 2018.

- Presentations

1) B. Pyne, V. Ravindra, P.R. Akbar, H. Saito, J. Hirokawa, "Performance Analysis of Edge-feed Rectangular Parallel Plate Slot-array Antenna Panel for Compact Space-borne X-band SAR System", Proceedings of the International Conference on Electromagnetics in Advanced Applications (ICEAA) - IEEE Topical Conference on Antennas and Propagation in Wireless Communications (APWC), Verona, September 2017, pp. 407-410.

- URLs for the Research Results on the Web

1) http://www.isas.jaxa.jp/topics/001134.html

Usage of JSS2

Computational Information

Parallelization Methods	MPI
Thread Parallelization Methods	Intel MKL
Number of Processes	2 - 80
Elapsed Time per Case	12.00 hours

Resources Used

Fraction of Usage in Total Resources*1 (%): 0.46

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	153.80	0.00
SORA-PP	443,619.62	5.55
SORA-LM	92,167.94	47.46
SORA-TPP	175.00	0.02

File System Resources		
File System Name	Storage assigned(GiB)	Fraction of Usage*2 (%)
/home	991.82	0.69
/data	22,842.42	0.42
/ltmp	11,718.76	0.88

Archiver Resources		
Archiver System Name	Storage used(TiB)	Fraction of Usage*2 (%)
J-SPACE	16.11	0.69

*1 Fraction of Usage in Total Resources: Weighted average of three resource types (computing, file system, and archiver)

*2 Fraction of Usage: Percentage of usage relative to each resource used in one year