Low Profile Aperture Coupled Microstrip Antenna for Inter CubeSat Communications

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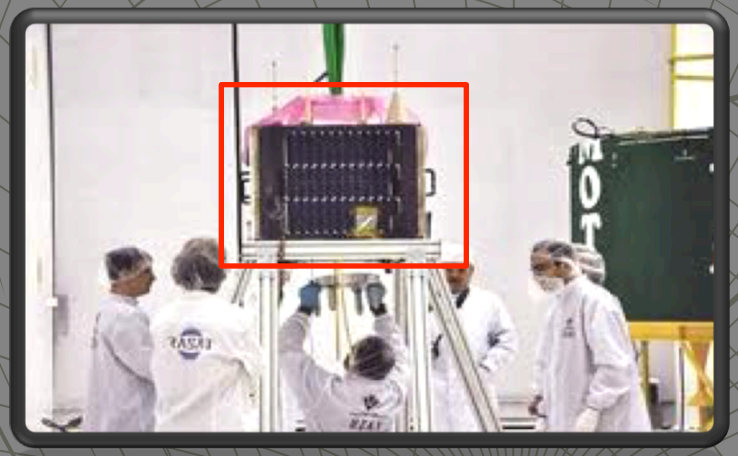
Outline

- Background
- Cube satellite antenna design challenges
- The proposed configuration of antennas for inter CubeSat communications
- The design of an individual proposed Aperture coupling microstrip antenna
- Results

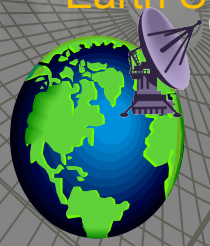
Background

Sun synchronies (Low Earth Orbit) Satellites

Large Satellite
Weight = > 80 Kg
Power = 1000 W



Pico Satellite (Cube Sate)
Weight = 1 Kg
Power = 2 W



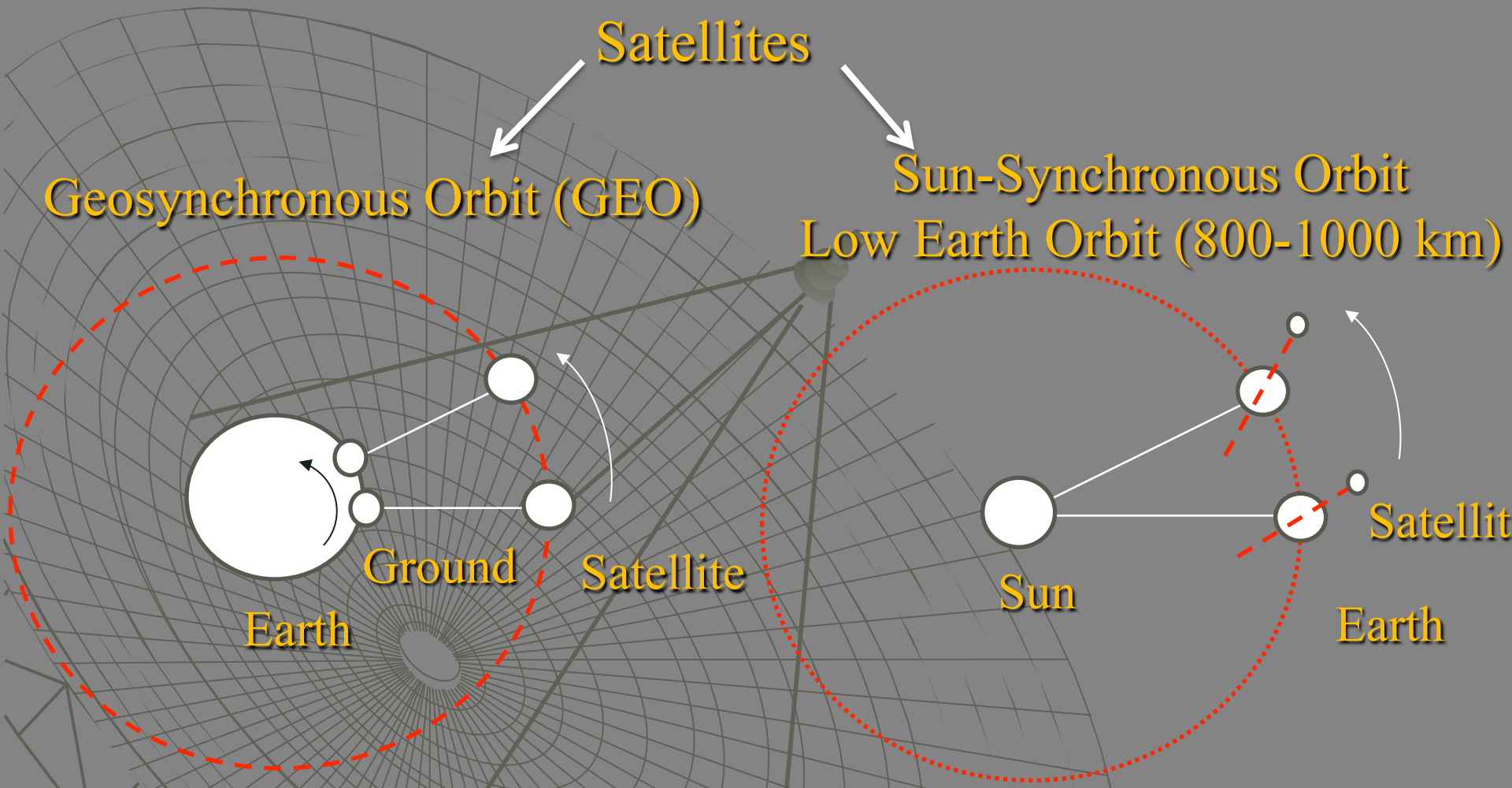
Earth Station

Earth

Satellite A

Satellite B

Background



- True Anomaly Synchronous with Ground
- Useful for Communications
- Altitude = 35,786 km

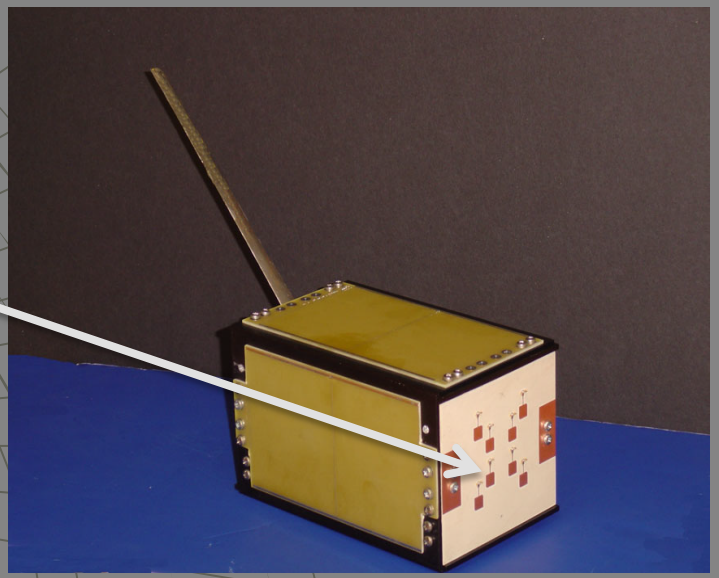
- RAAN Synchronous with Sun
- Useful for remote sensing
- To Simplify Satellite Design

Cube Satellite Antenna Design Challenges

1- Weight and size 2- Power consumption 3- Antenna Gain

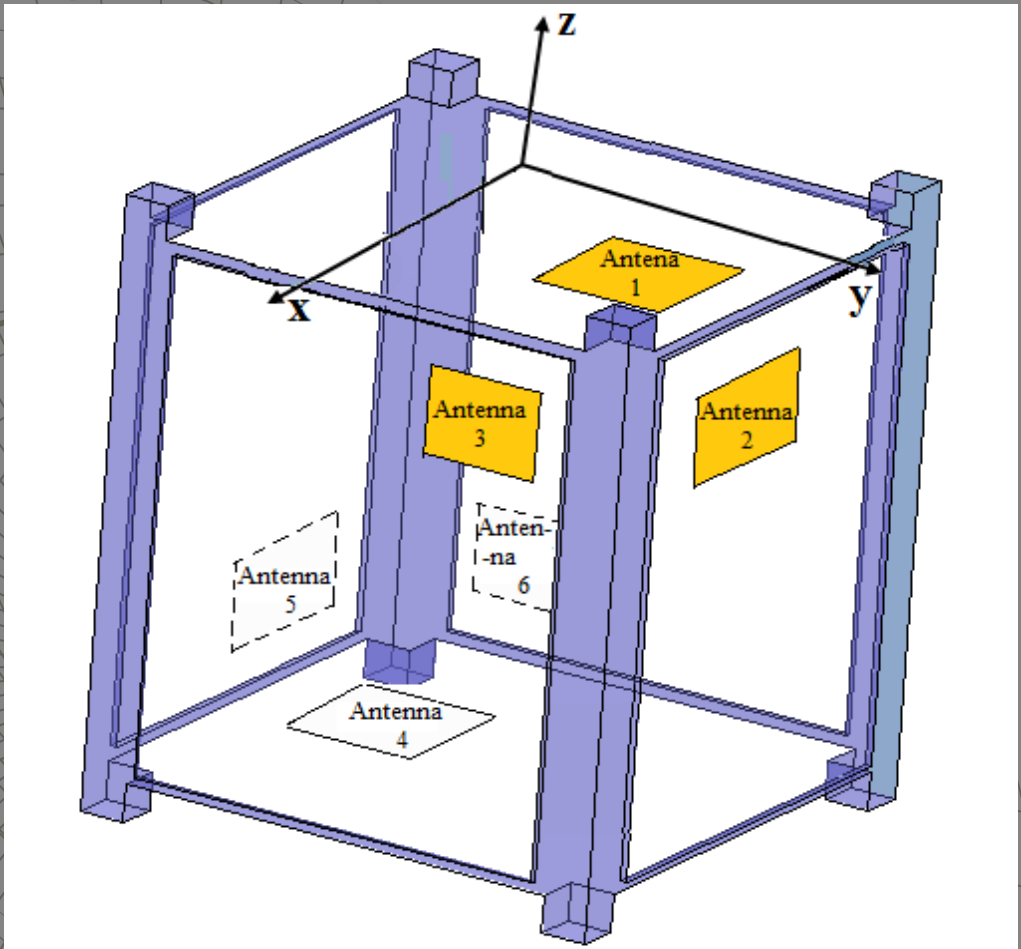
4. Deployment mechanism

Large satellite
Horn Antenna

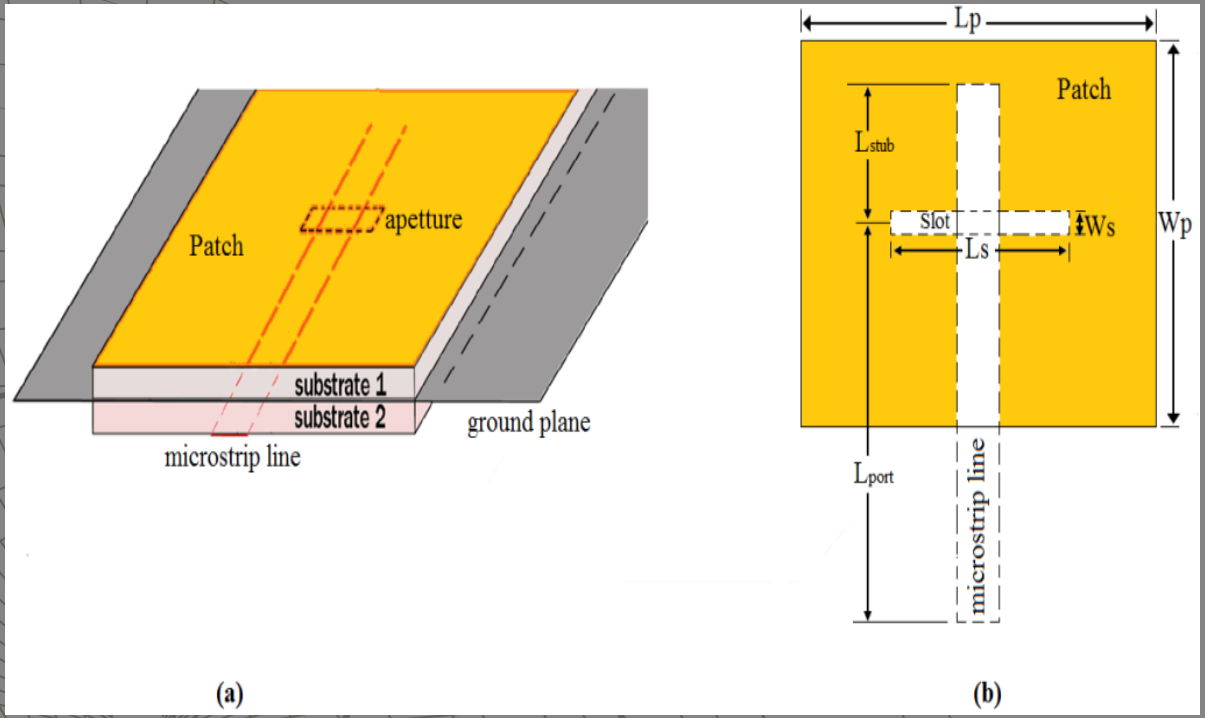


Small satellite (Cube satellite)
Planar antenna (patch)

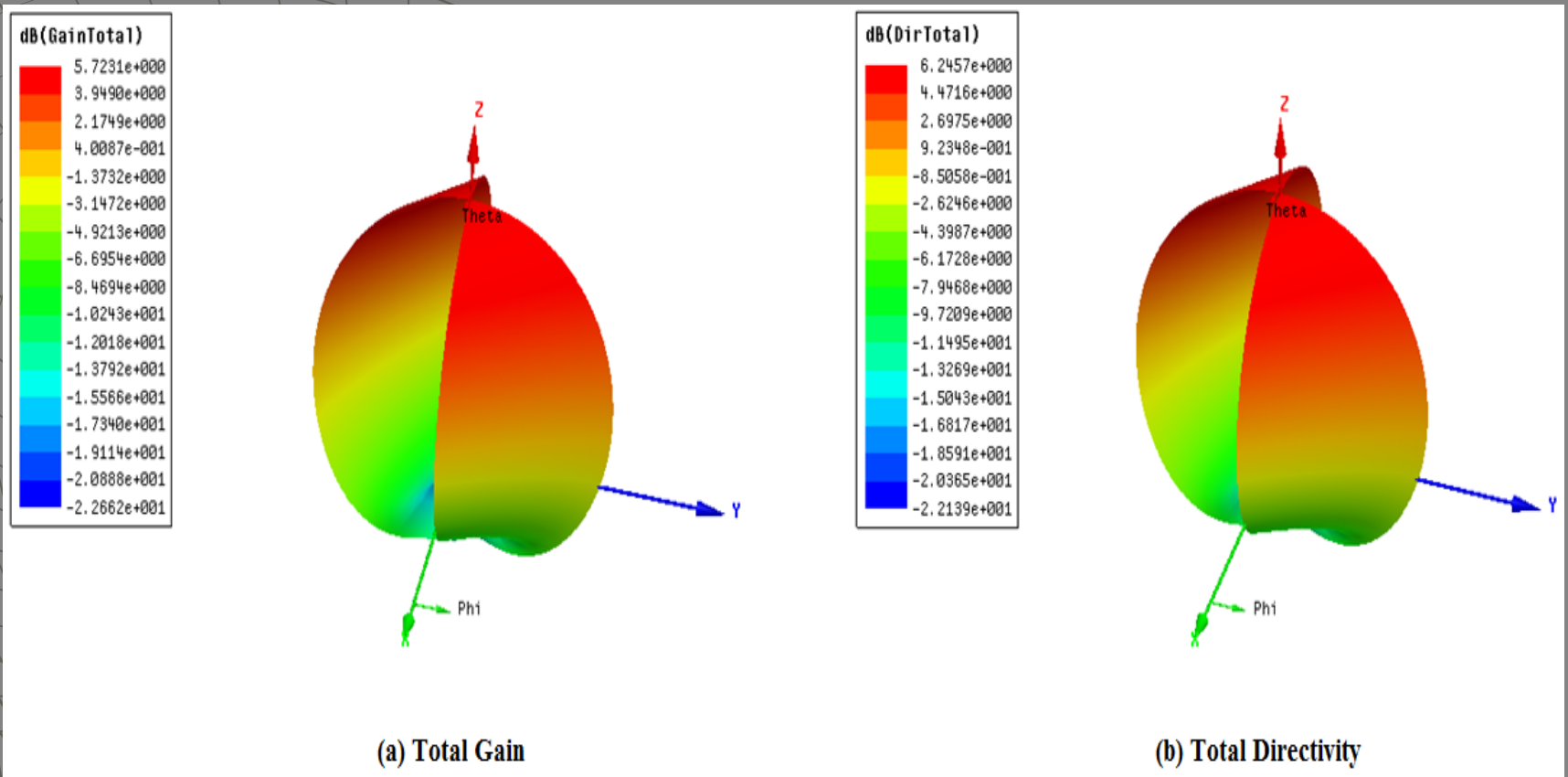
The proposed configuration of six planar antennas



The individual ACM antenna design



Results

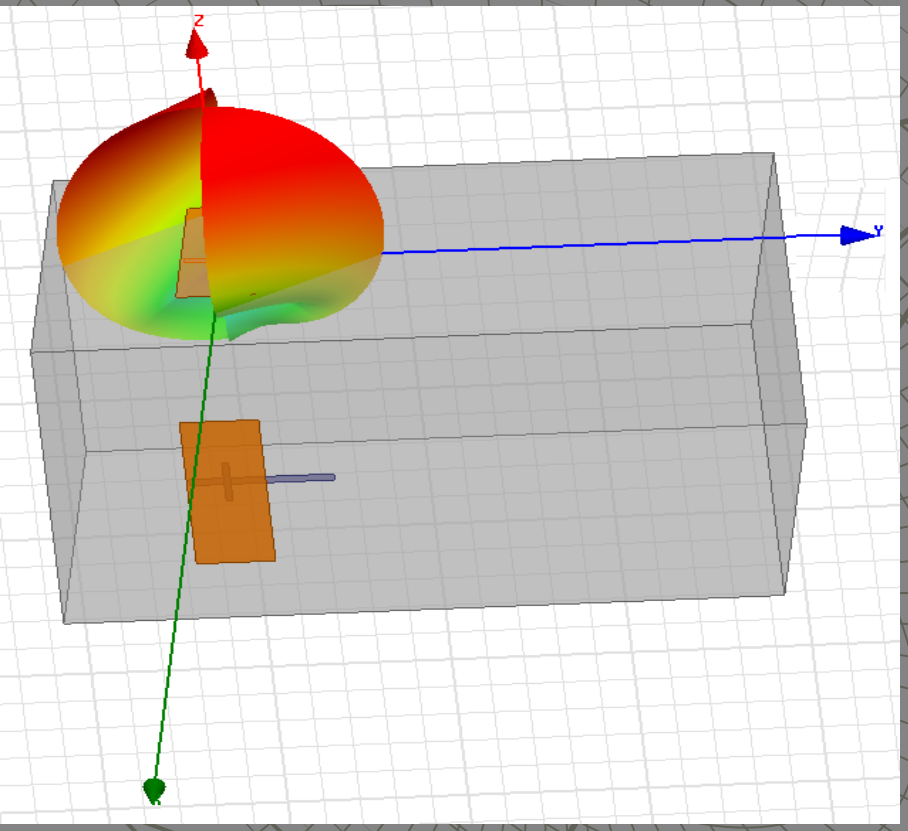


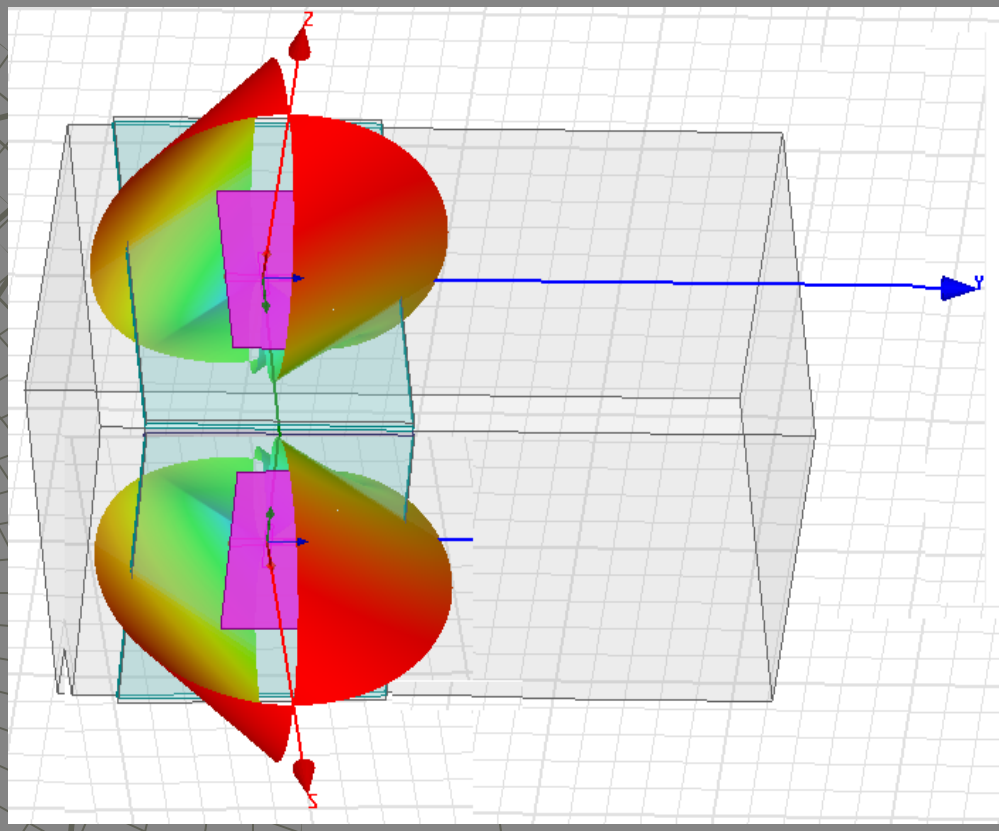
(a) Total Gain

(b) Total Directivity

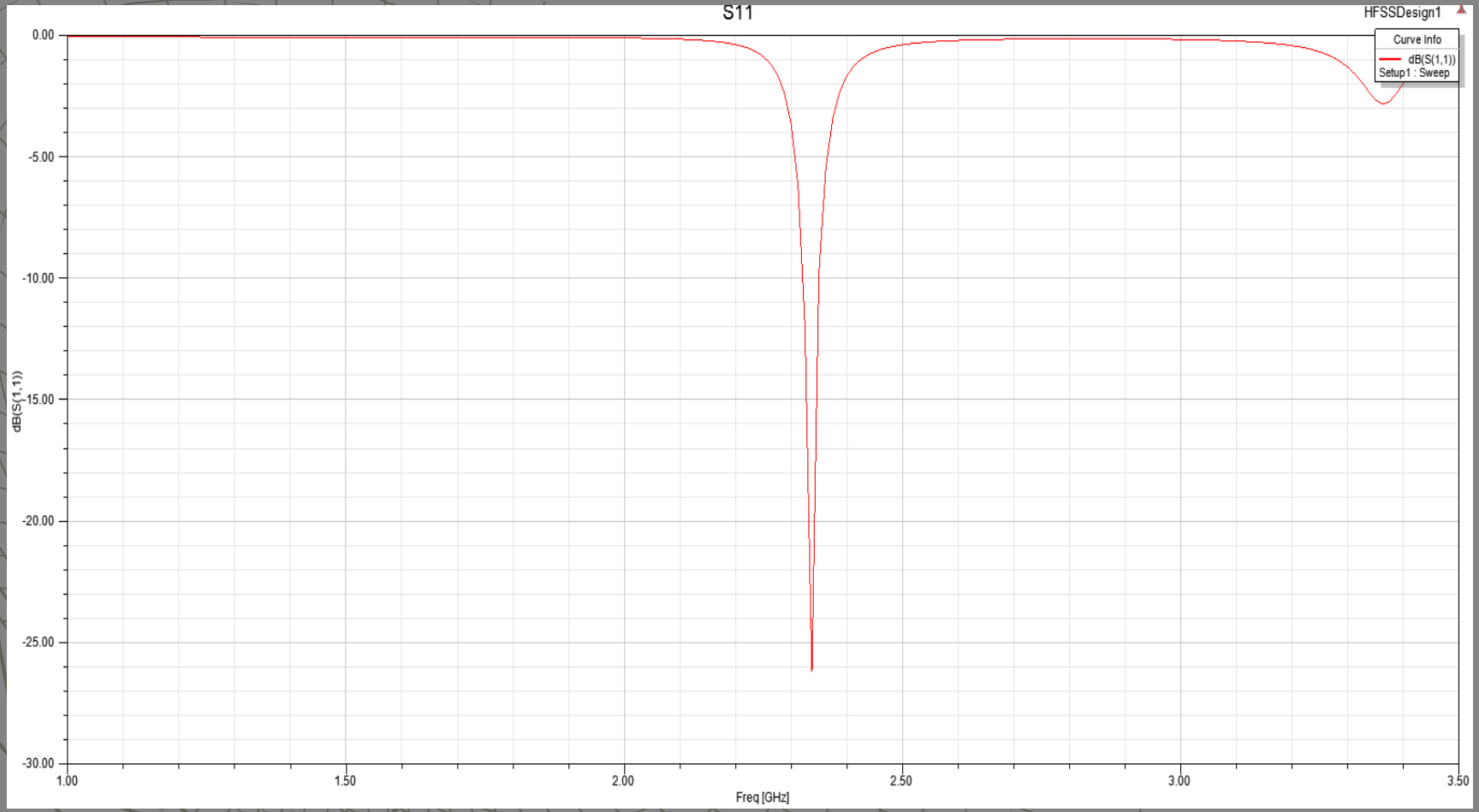
Simulated results of (a) the total gain, and (b) total directivity of the individual ACM

Using HFSS for simulating the antenna on 2U cubesat





The Quasi Newton method works on the basis of finding the minimum or maximum of a cost function by varying the variables to meet the constraints.



S11 of ACM antenna design


Thank you
for your attention


Time for QUESTIONS