

Parallel-Plate Slot Array Antenna for MicroXSAR Mission

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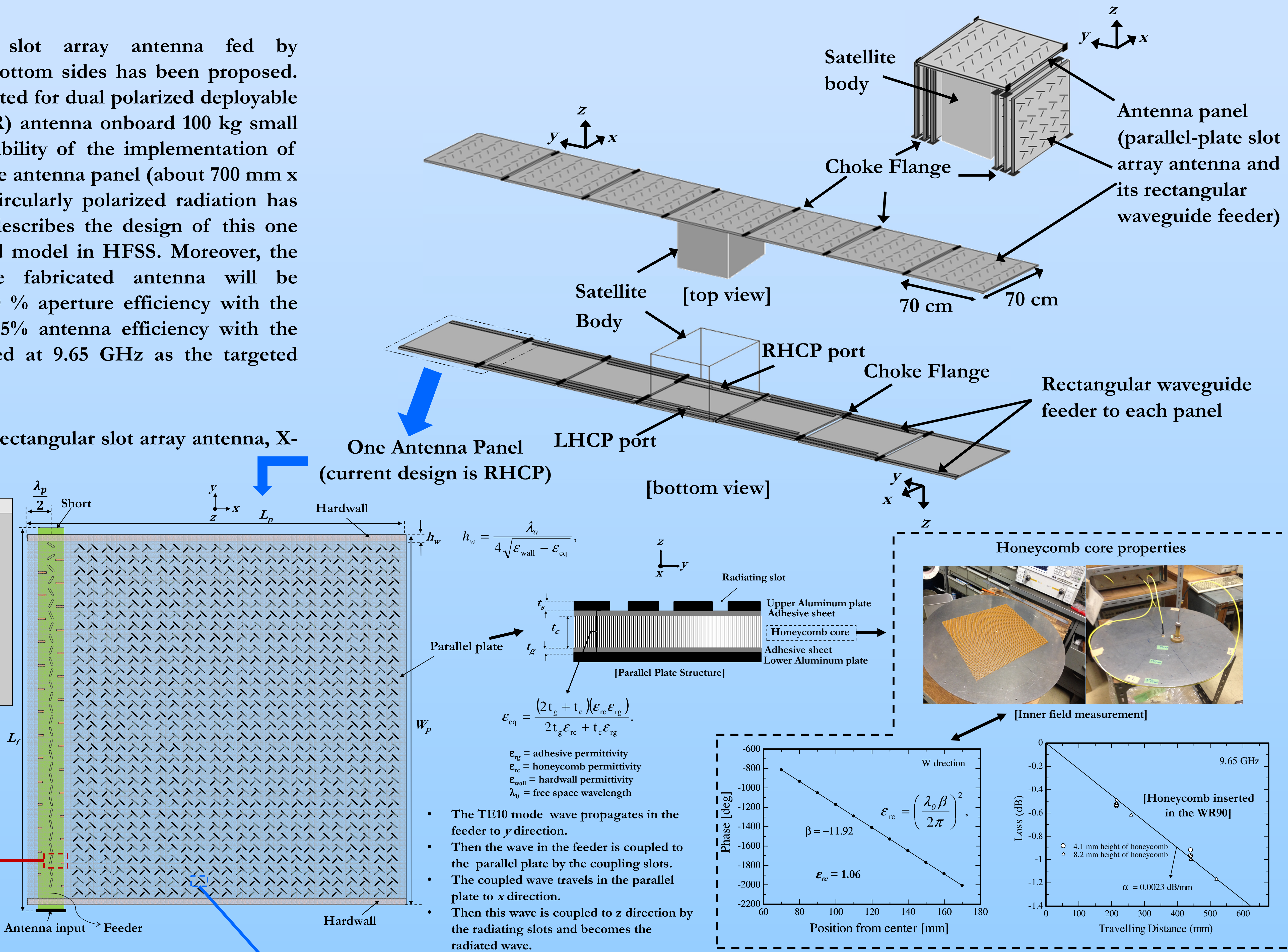
Abstract

Rectangular parallel-plate slot array antenna fed by rectangular waveguide at its bottom sides has been proposed. This antenna will be implemented for dual polarized deployable Synthetic Aperture Radar (SAR) antenna onboard 100 kg small satellite. As to verify the possibility of the implementation of this antenna, experiment on one antenna panel (about 700 mm x 700 mm) with right handed circularly polarized radiation has been conducted. This paper describes the design of this one antenna panel using simplified model in HFSS. Moreover, the measurement results of the fabricated antenna will be discussed. It is shown that 80 % aperture efficiency with the directivity of 36.5 dBic and 55% antenna efficiency with the gain of 34.9 dBic are achieved at 9.65 GHz as the targeted center frequency.

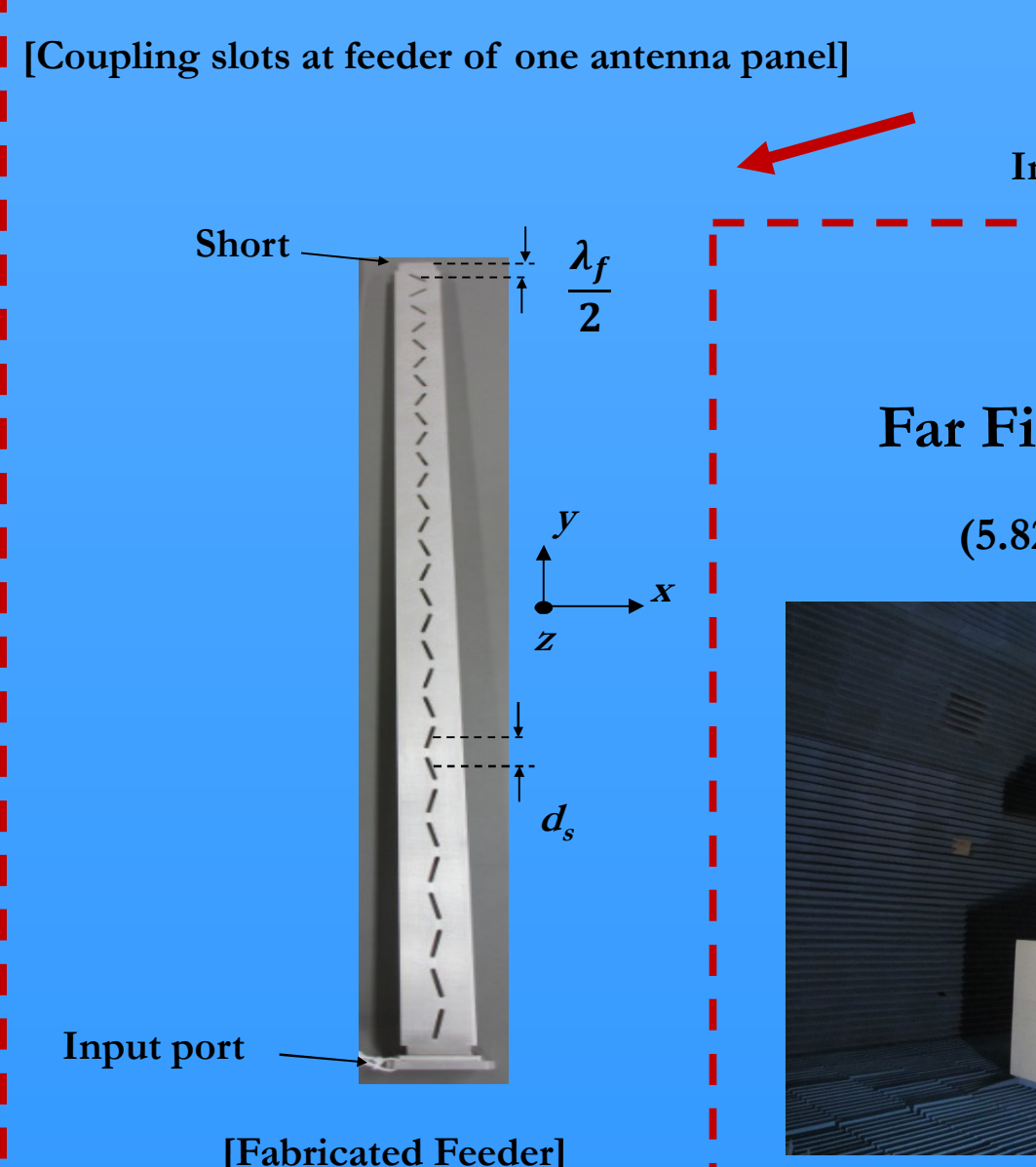
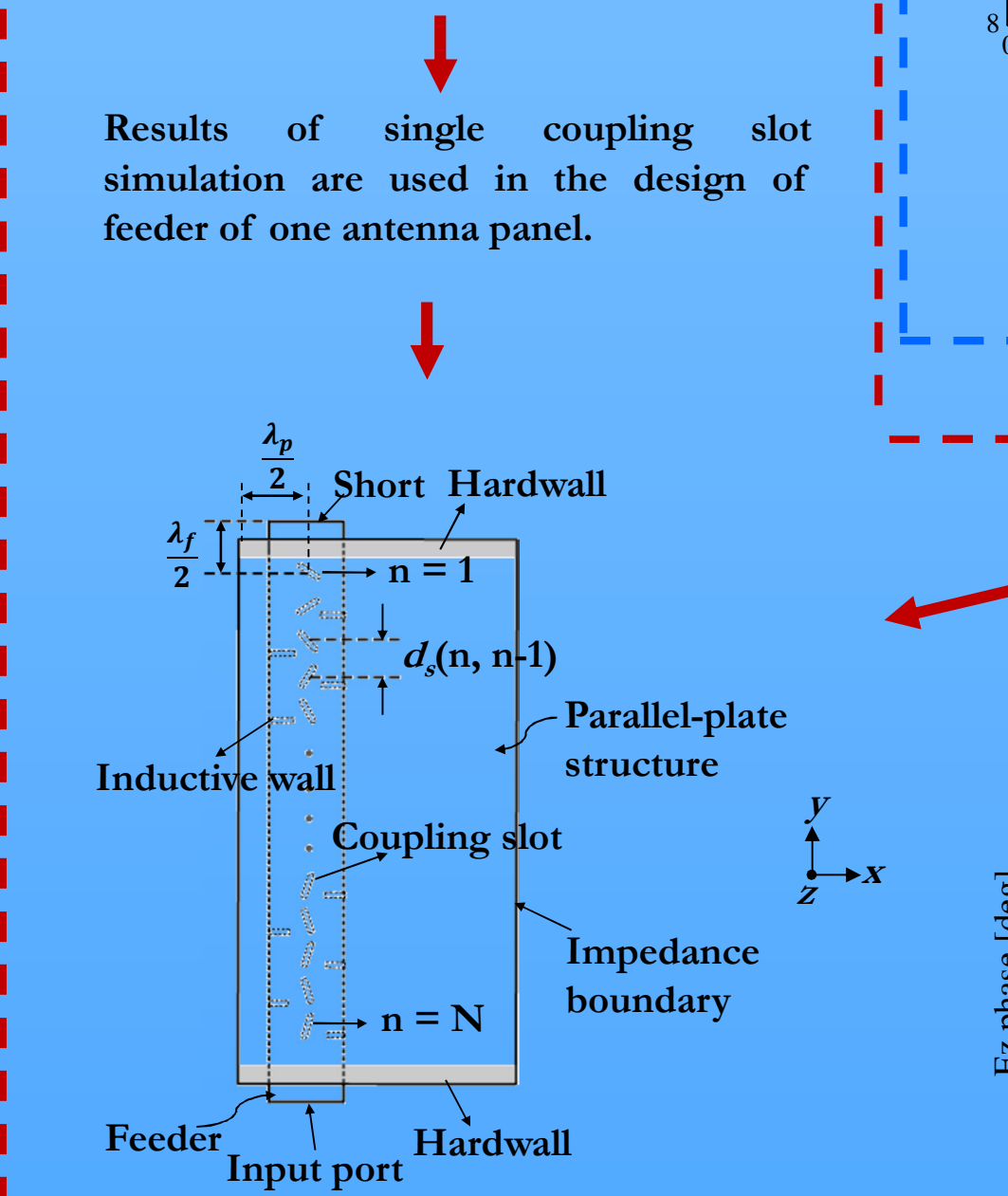
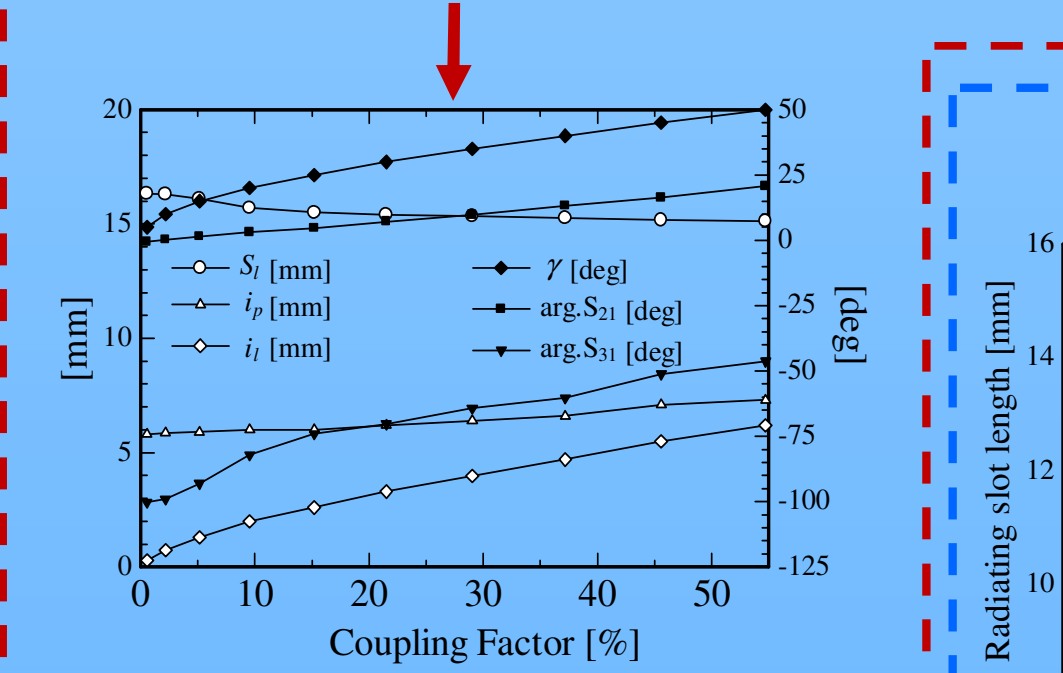
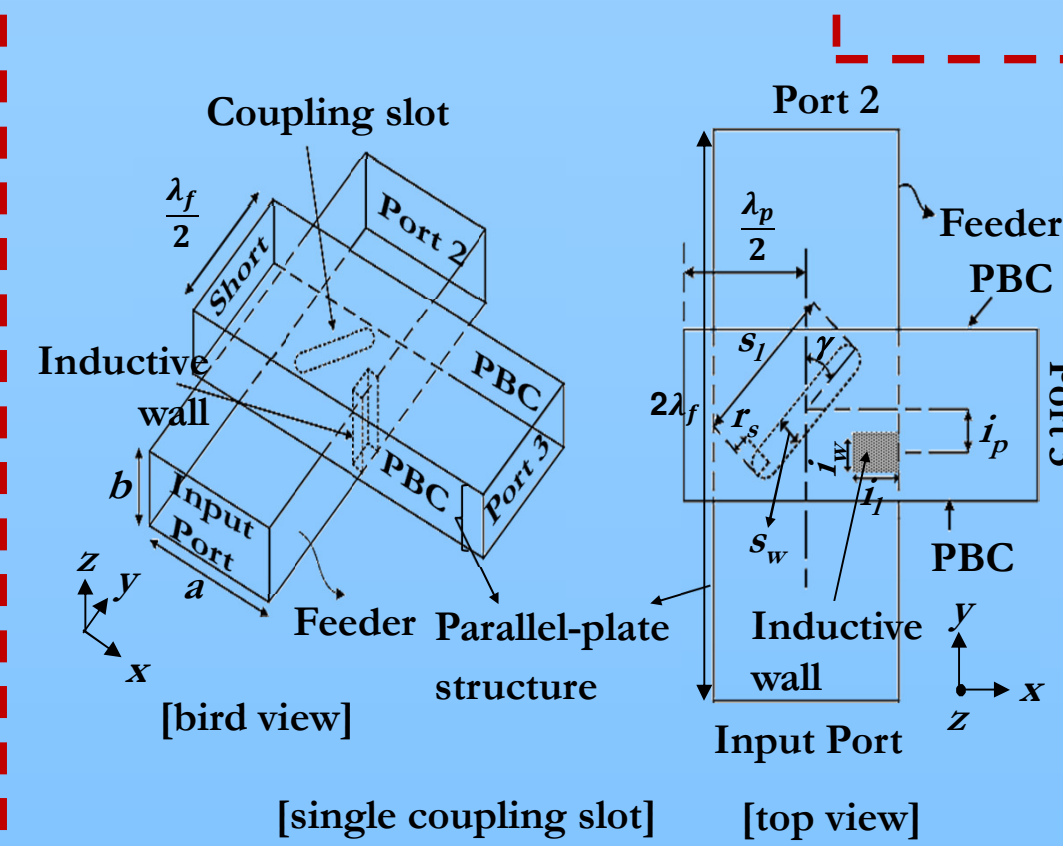
Keywords : small SAR sensor, rectangular slot array antenna, X-band antenna

Parameters	Size (mm)
Parallel-plate ($W_p \times L_p$)	657.2 x 700
Feeder Length (L_f)	678.4
Feeder inner size (a x b)	22.86 x 10.18
Inductive wall width, i_w	1
Slot width, s_w	2
Slot round edge radius, r_s	1
Hardwall width, h_w	4.89
The thickness of	
- Aluminum skin sheet, t_s	0.3
- Adhesive sheet, t_a	0.13
- Honeycomb core (SAH-1/4-1.5), t_c	6
- Hardwall	6.26
- Feeder broad wall	1

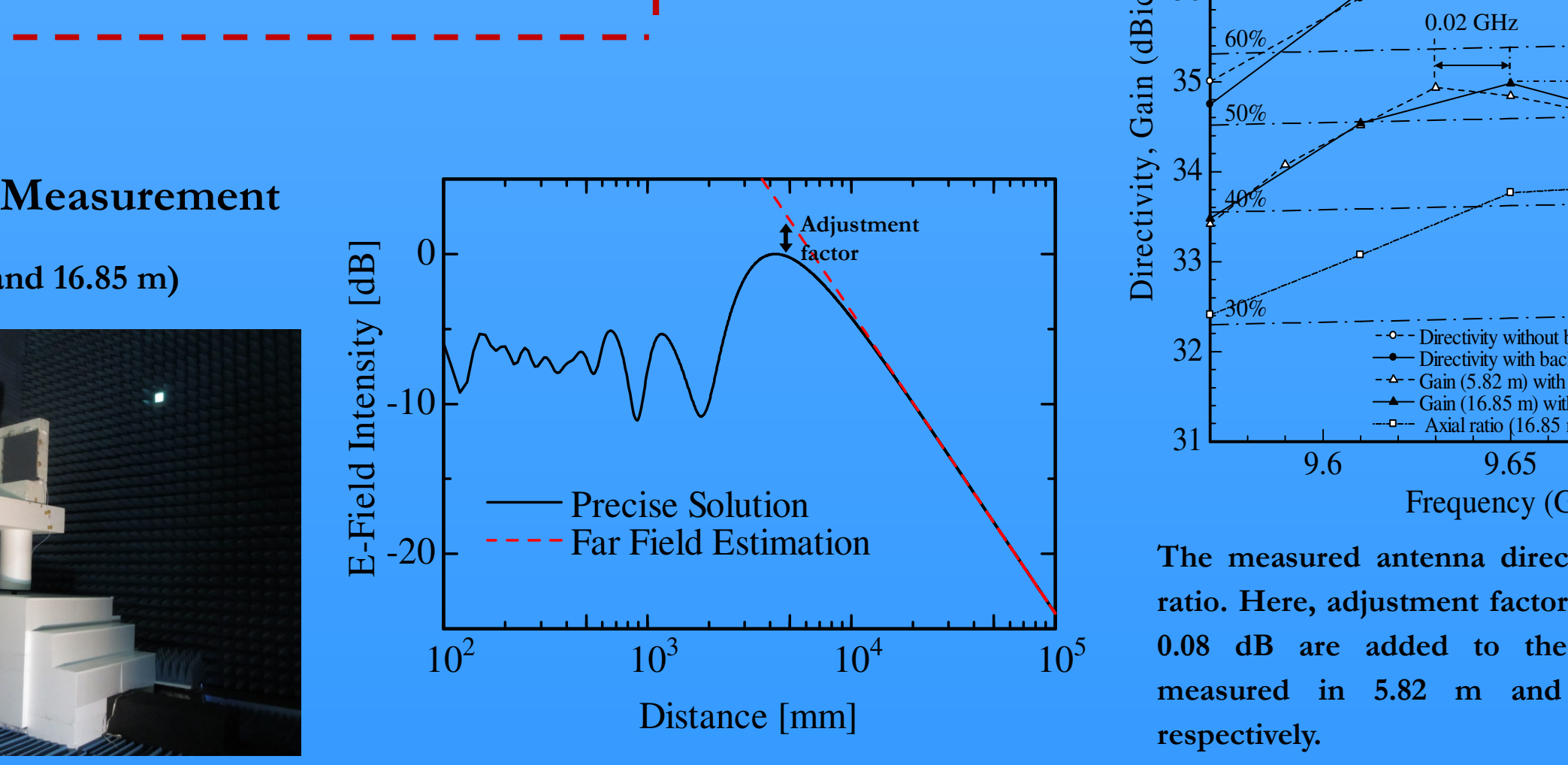
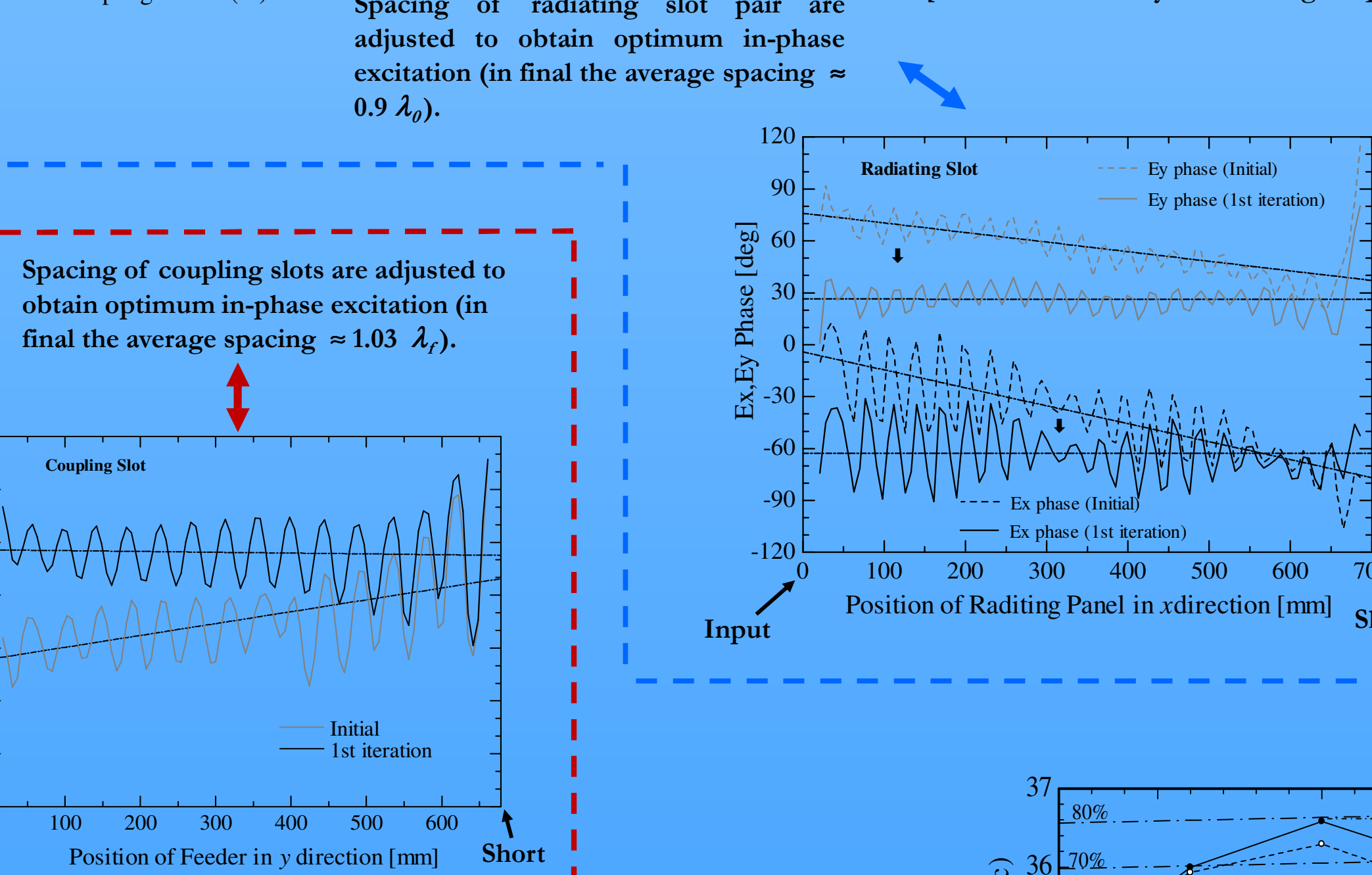
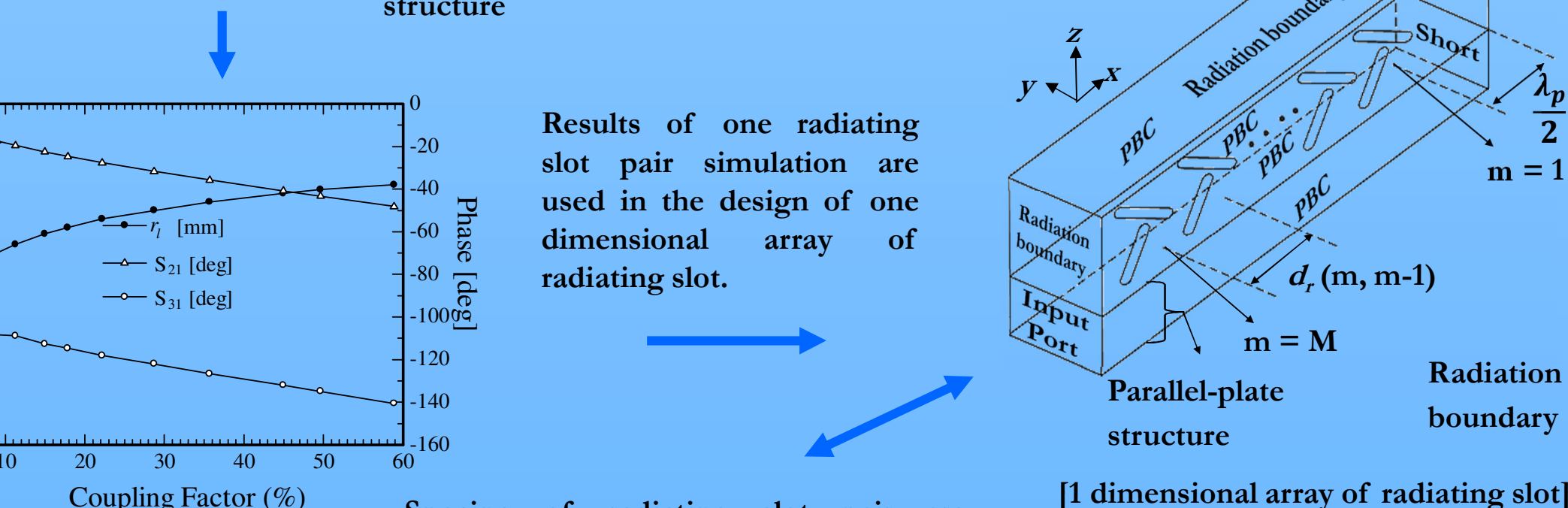
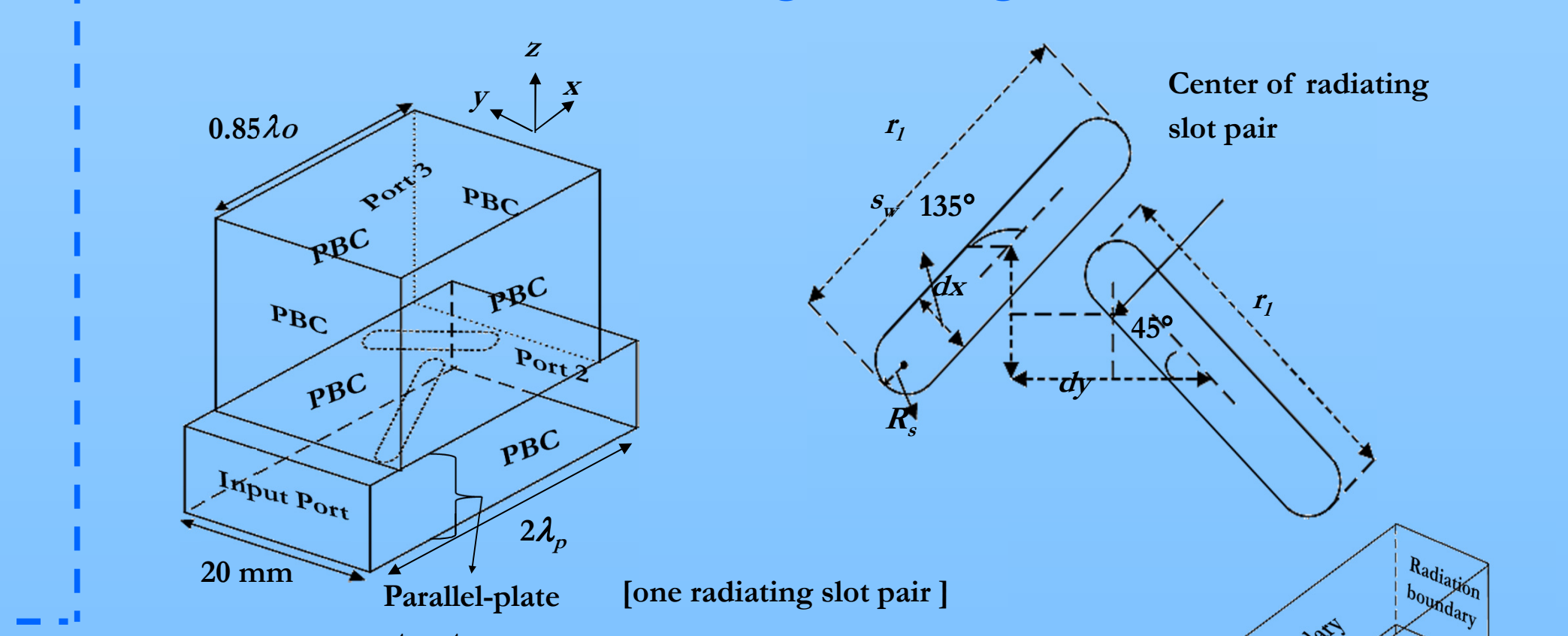
Item	Mass (gram)
Upper parallel aluminum plate	344
Lower parallel aluminum plate	358
Honeycomb core sheet	65
Adhesive sheet	138
Hard Surface wall	57
Aluminum Frame	24
Feeder waveguide	162
Total antenna system	1148



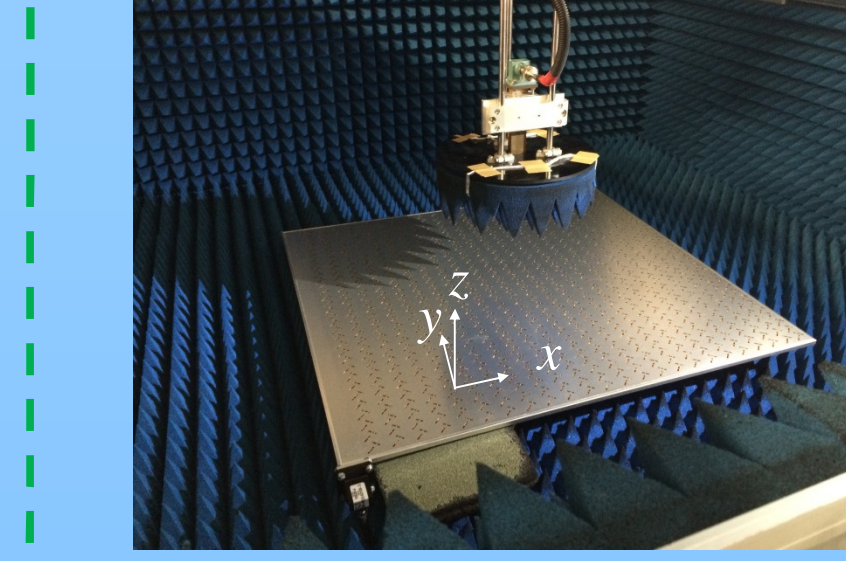
Coupling slot Design



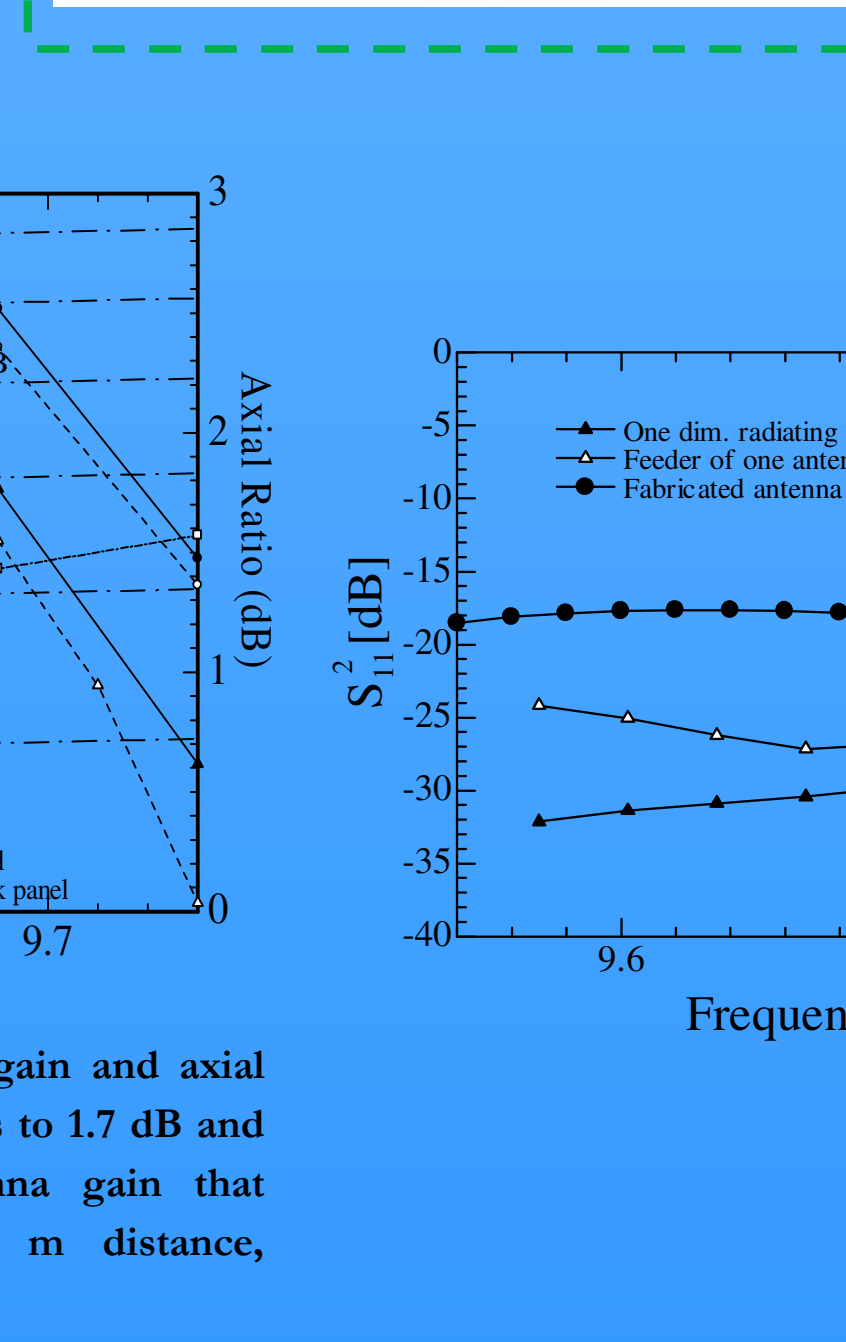
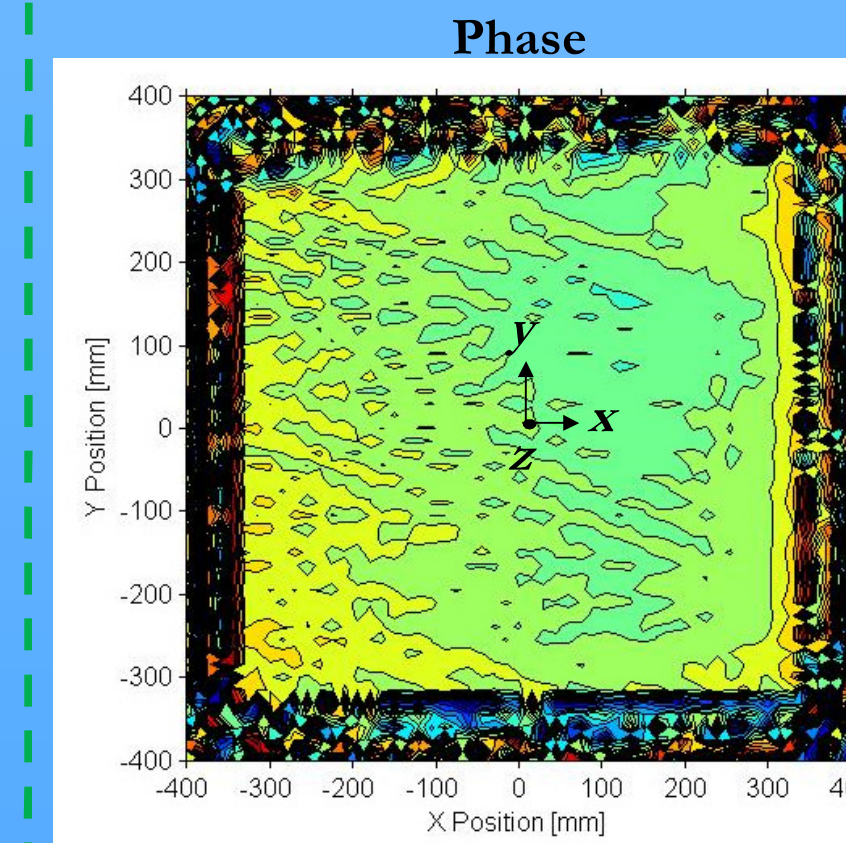
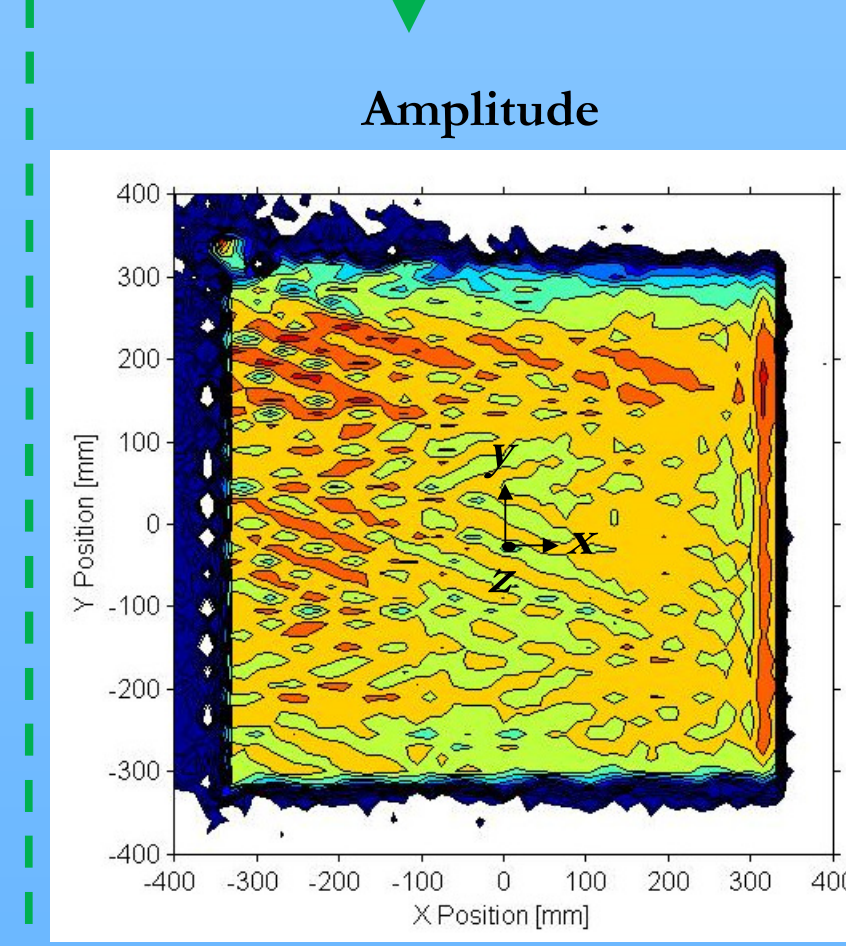
Radiating slot Design



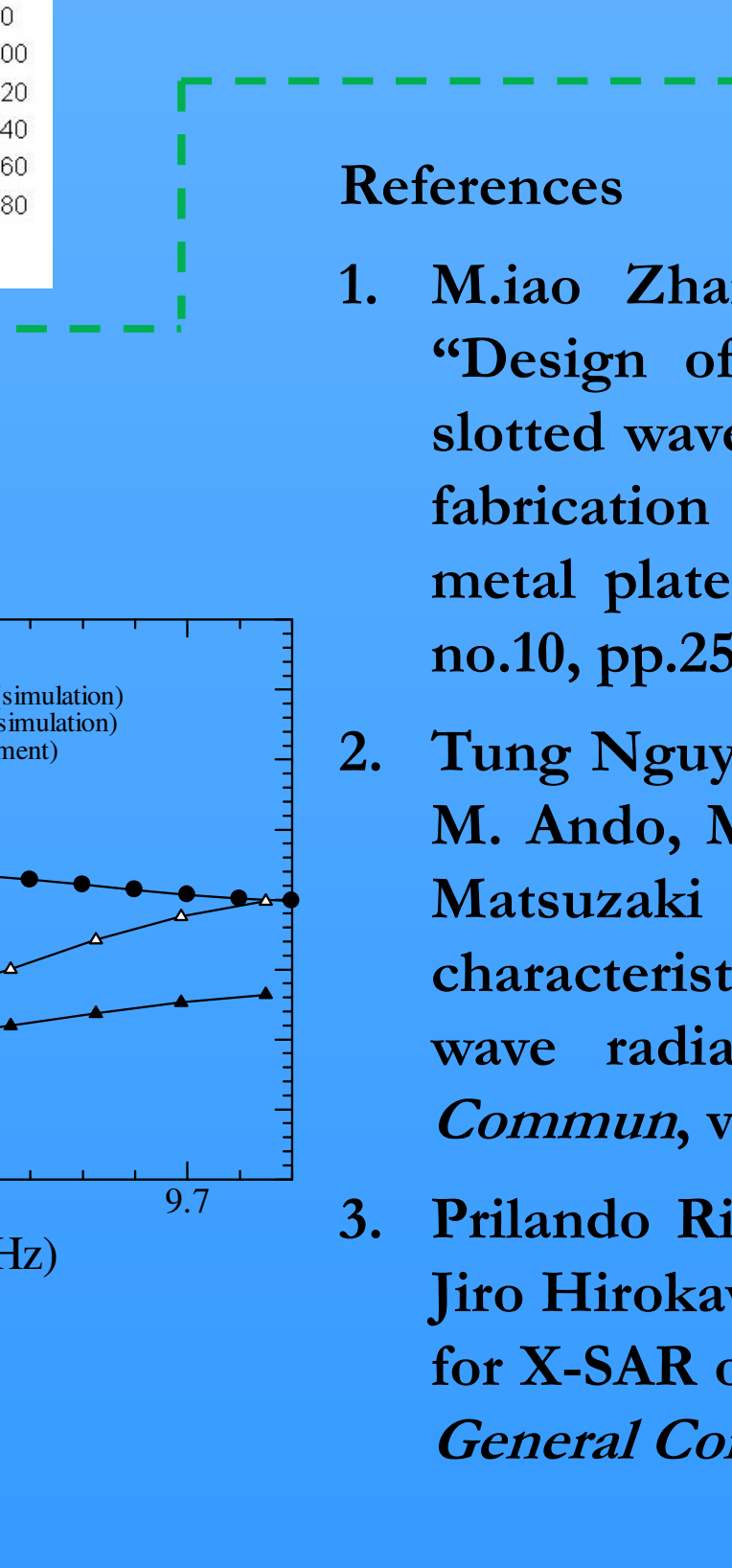
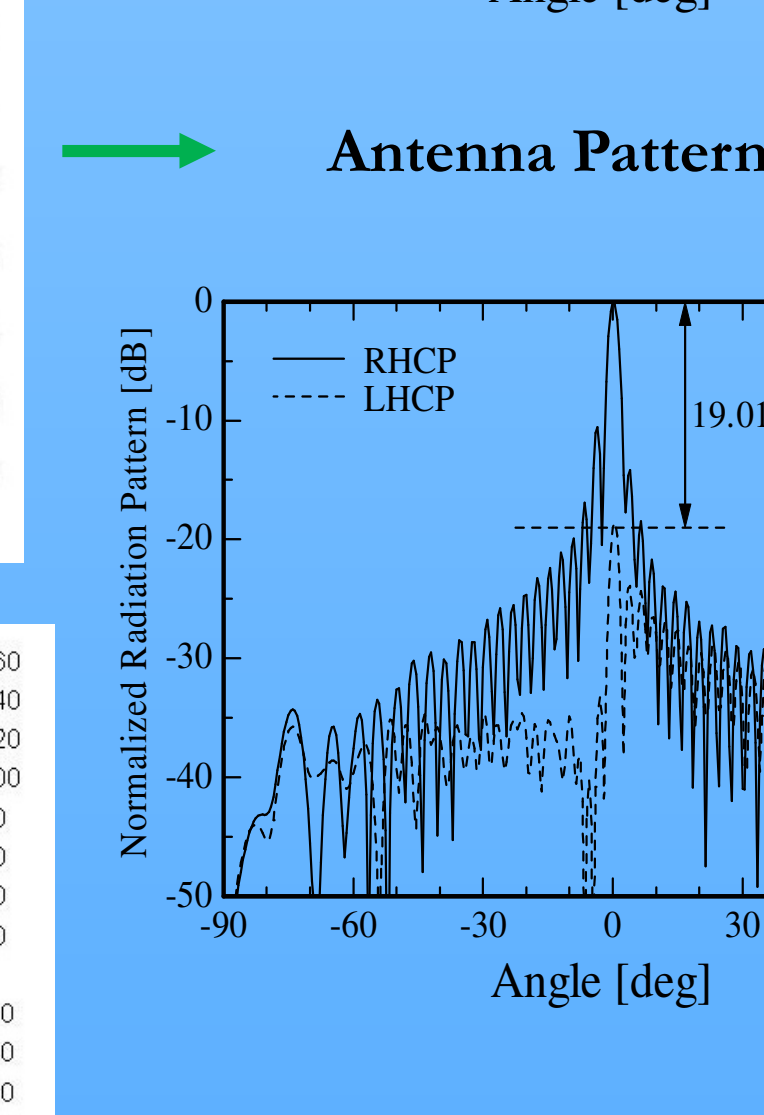
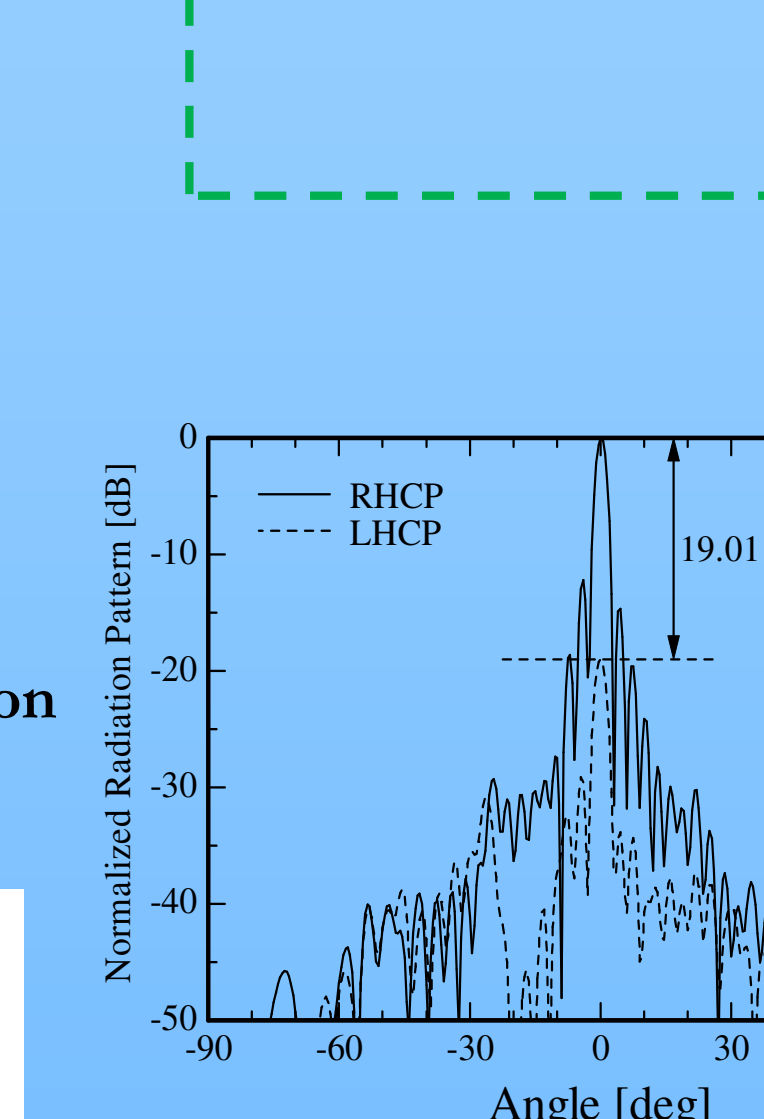
Near Field Measurement



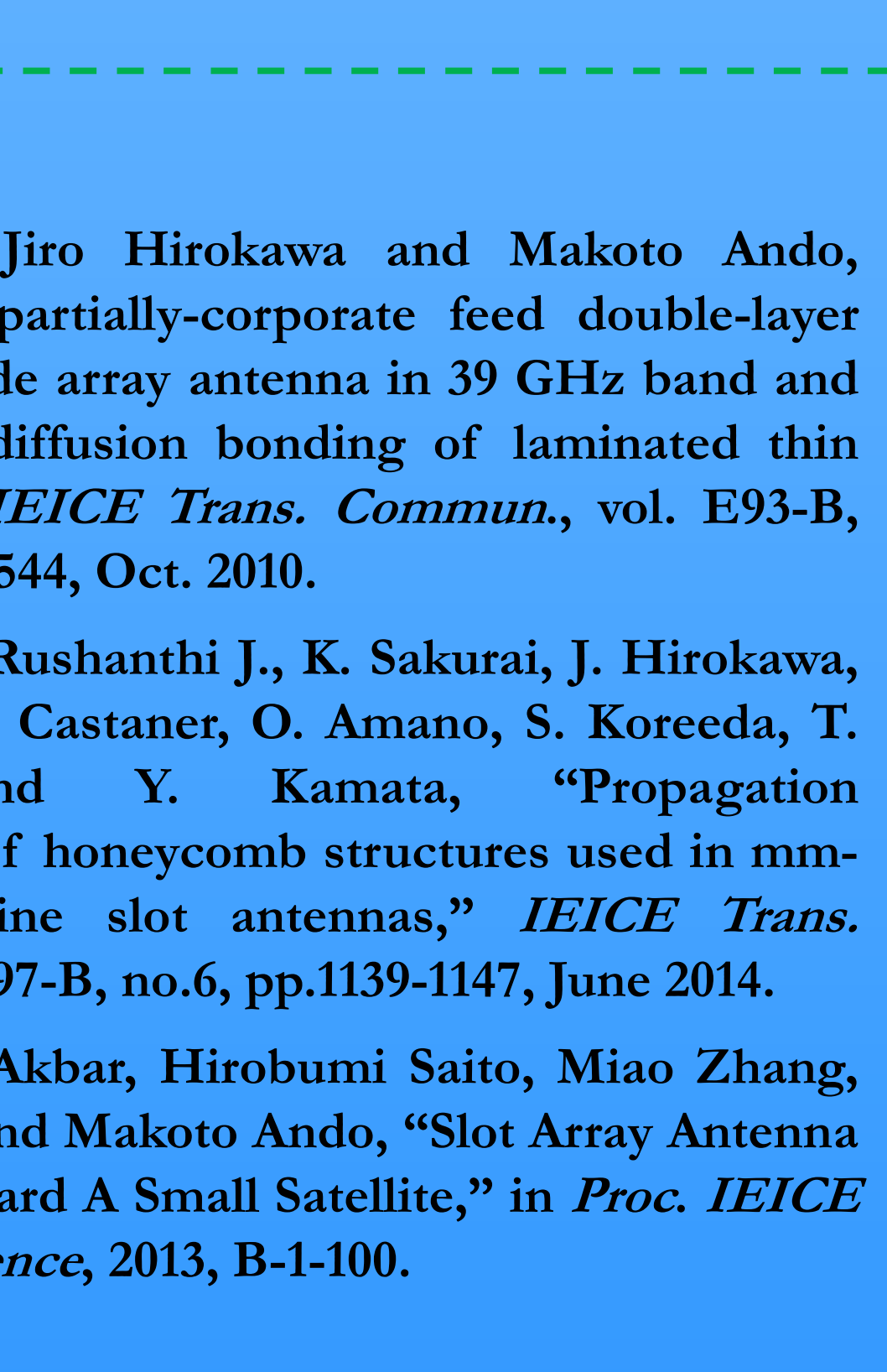
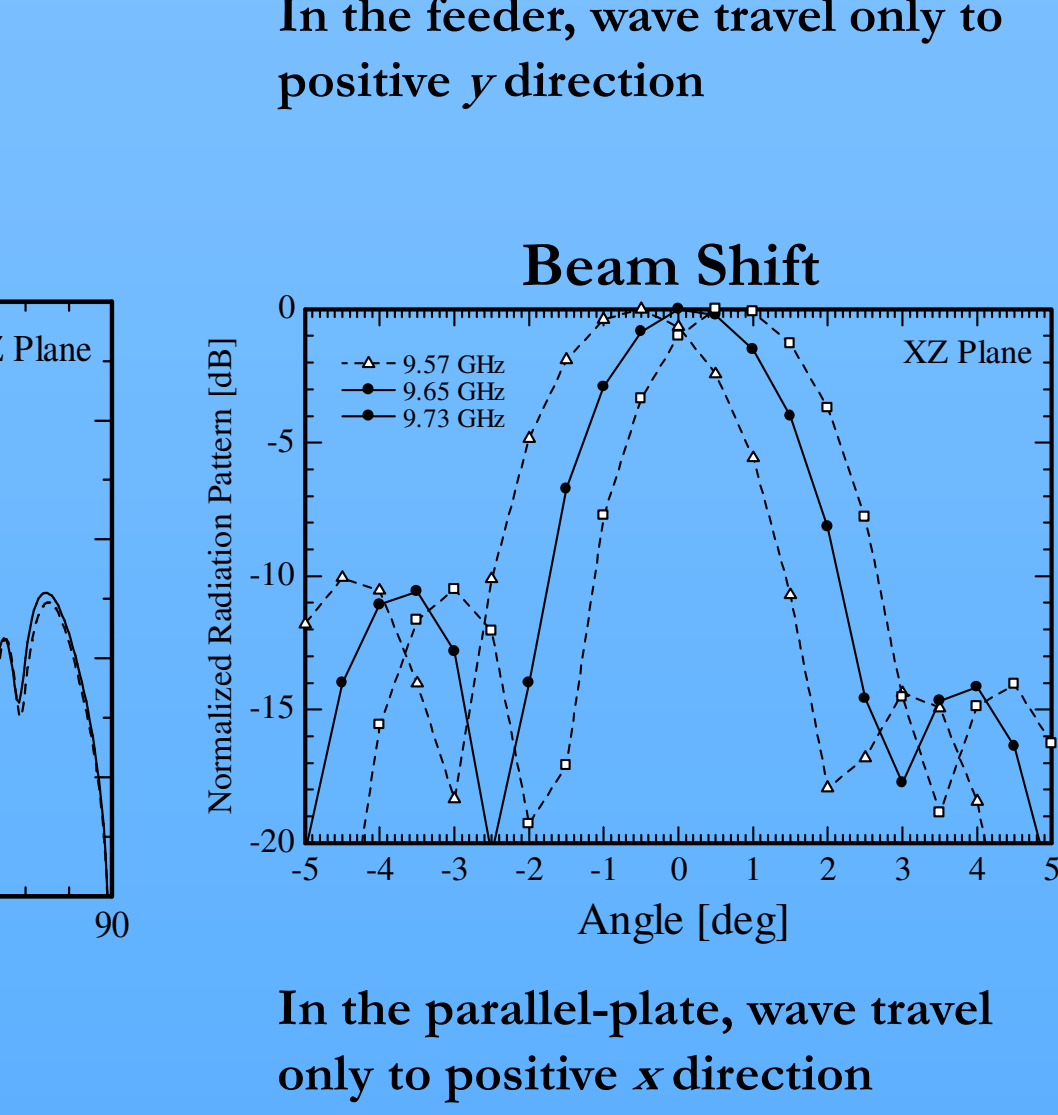
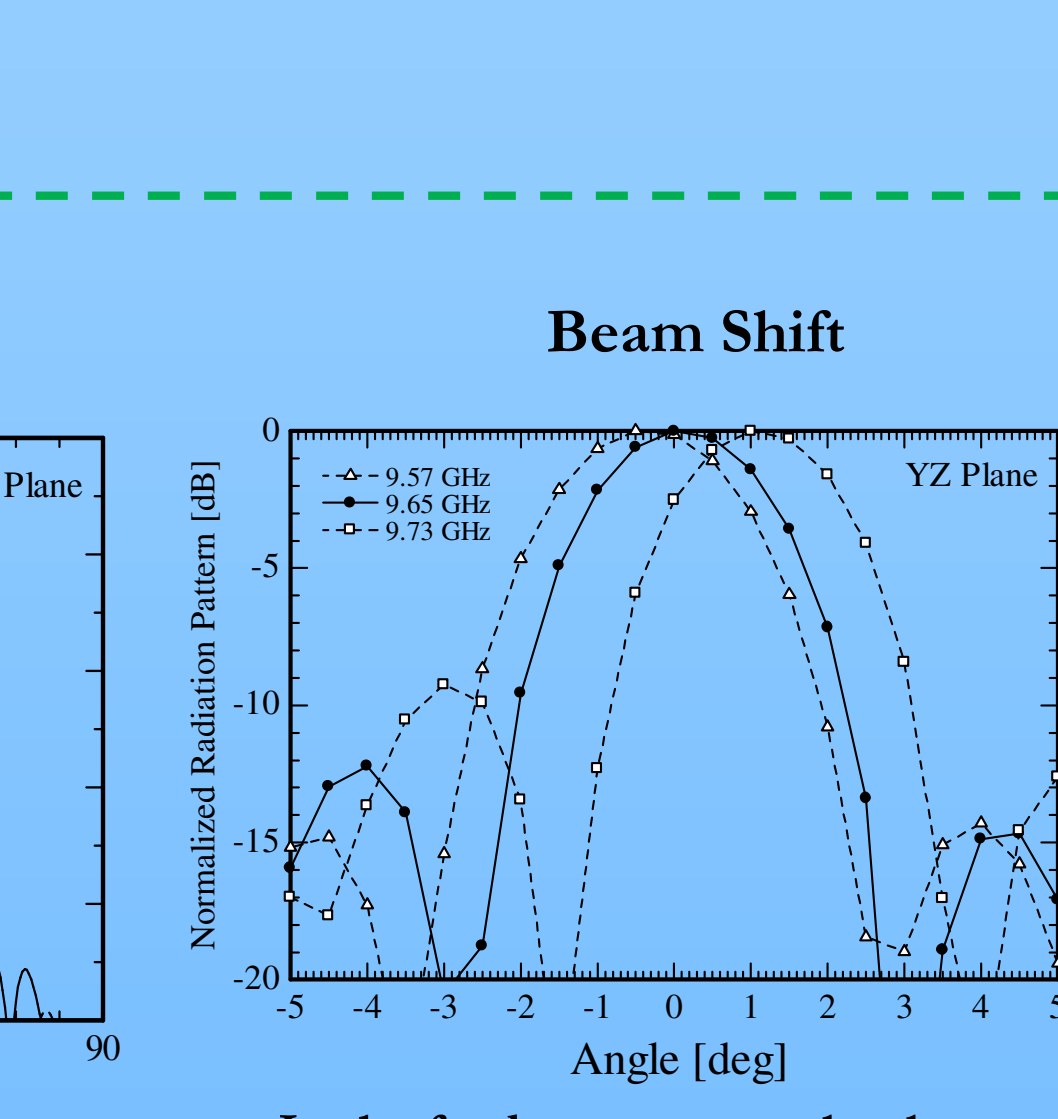
Aperture Distribution



Antenna Pattern



Beam Shift



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