

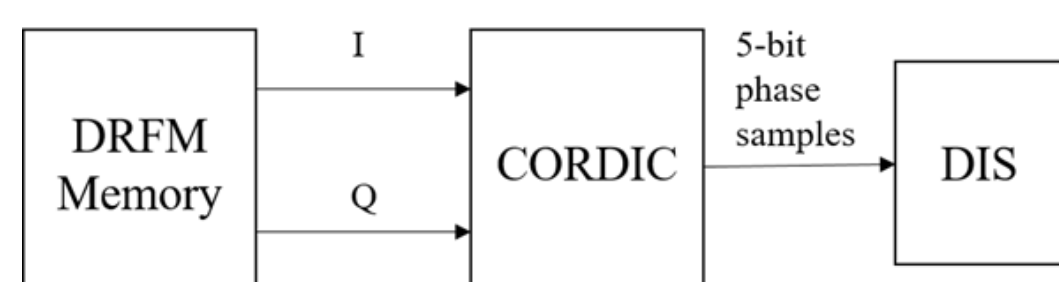
DRFM CORDIC PROCESSOR & SEA CLUTTER MODELING FOR ENHANCING STRUCTURED FALSE TARGET SYNTHESIS

Author: Military Expert 5 Ang Pak Siang
Advisors: Professor Phillip Pace, Prof Douglas Fouts

1. Objectives of thesis

- Design a processor to extract phase information from ISAR radar waveform for a phase-sampling Digital Image Synthesizer (DIS)
- Create a sea clutter profile to enhance the realism of the false target generated by the DIS.

2. Main research ideas



Design the phase extracting processor using the CORDIC algorithm,

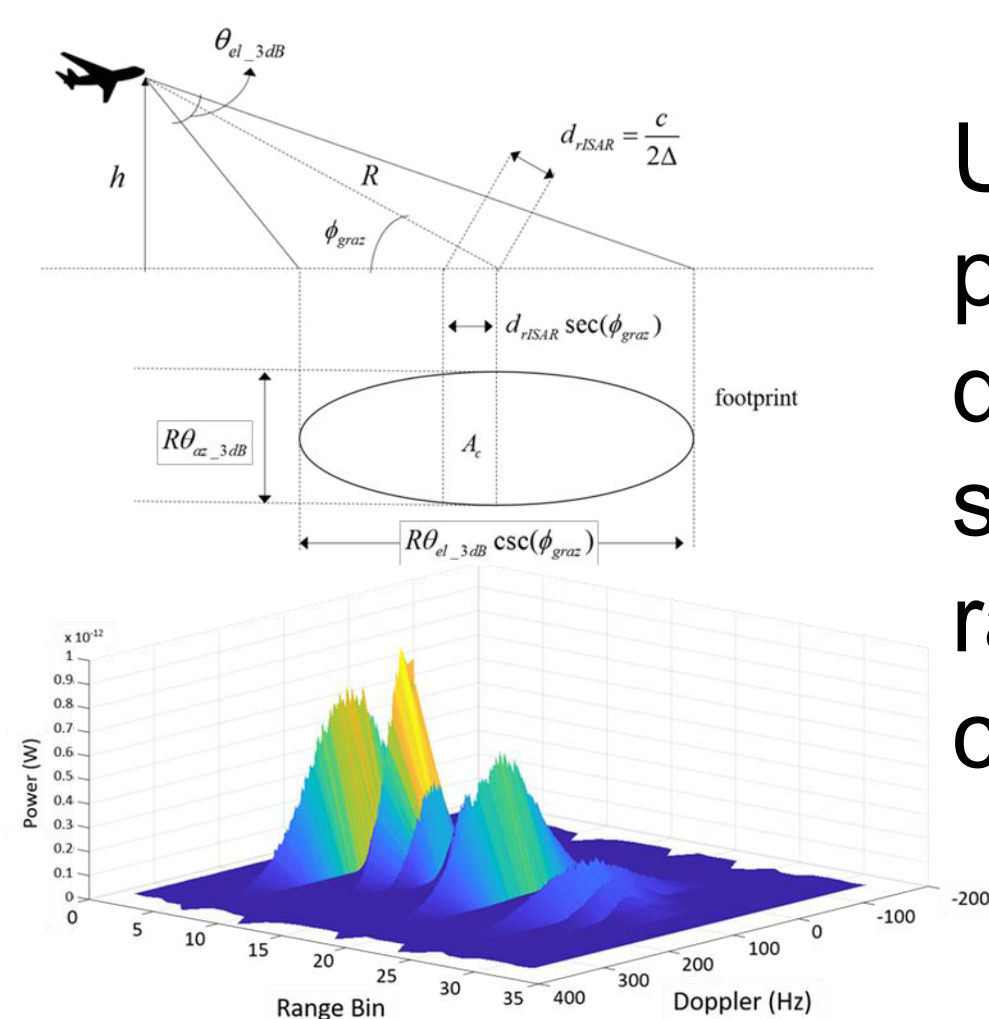
Reduce the complexity to the class of shift-and-add algorithm.

Incorporate a pipeline architecture into the system design,

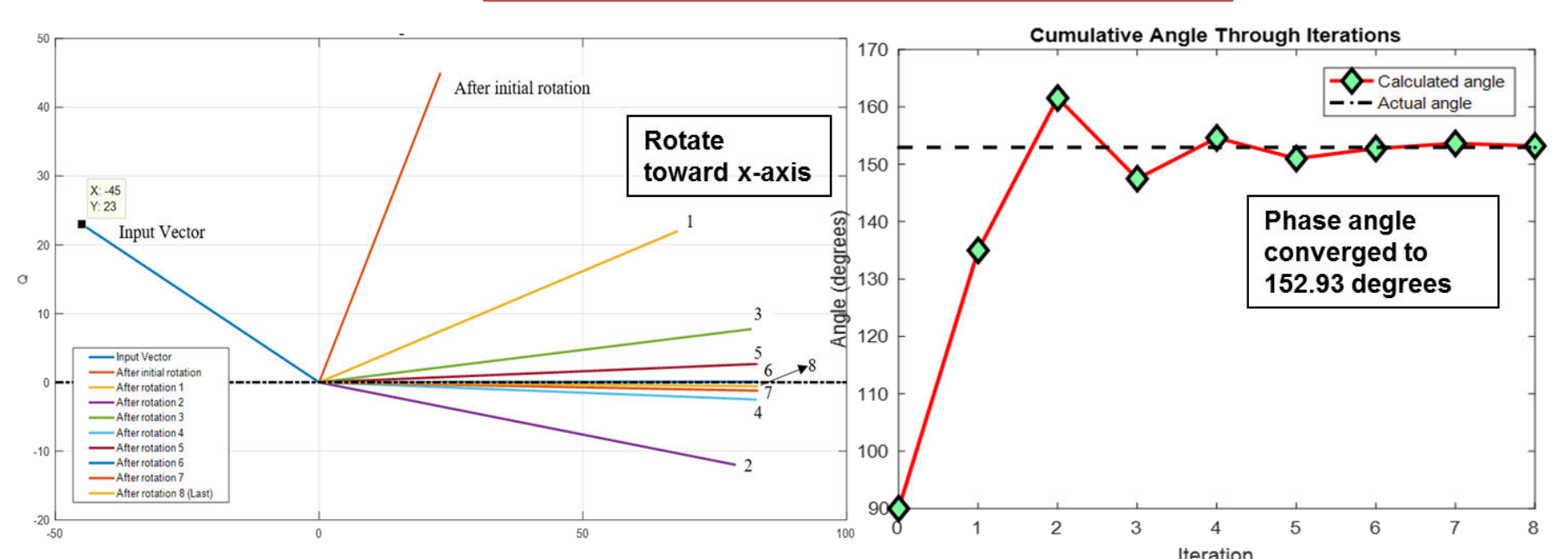
Increase the system throughput and hence the effectiveness of the DIS.

Using probability distribution to simulate random sea clutter

Simulate fluctuating power and Doppler spectrum of the sea clutter

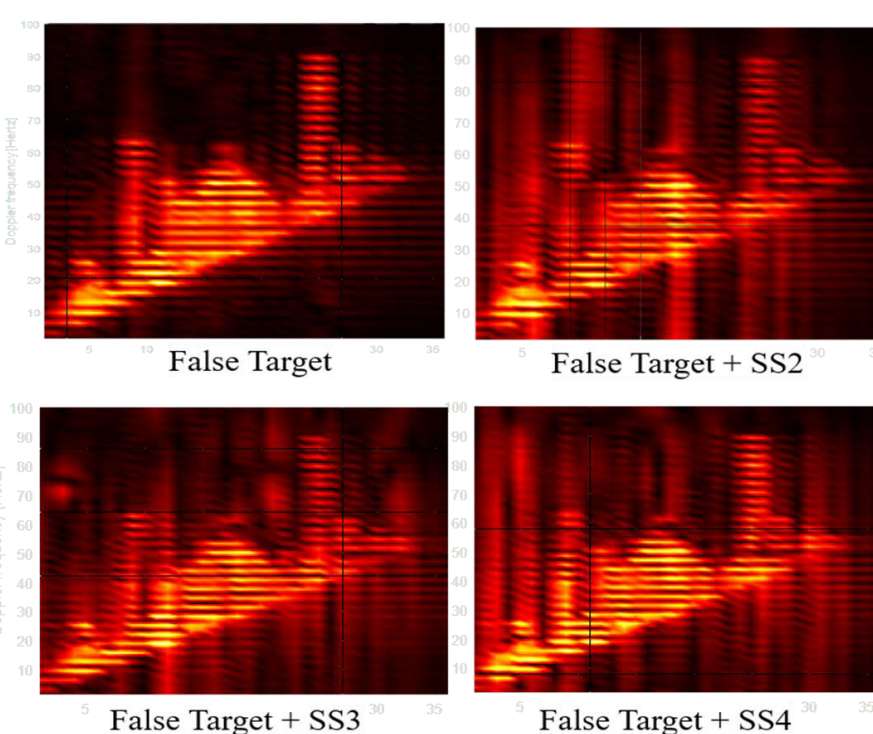


3. Research Results



Processor is able to extract phase information with sufficient accuracy:

- Error $< 5.625^\circ$ for a 5-bit phase sample.
- New phase sample output at every clock cycle.
- Written in MATLAB, Verilog



ISAR images of false target with and without sea clutters



Sea clutter can be simulated and can be combined with the false target profile generated by the DIS.

4. Potential application of the research

- Digital Signal Processing
- Radar Performance Analysis

5. Follow Up Research Activities

- Explore using the amplitude output from the CORDIC processor to reconstruct the ISAR waveforms.
- Validate the sea clutter model using real data.