Inverse Synthetic Aperture Radar (ISAR) Imaging Simulation Software

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Introduction

- ❖ Inverse Synthetic Aperture Radar (ISAR) imaging techniques are used to estimate the target spatial image using target backscatterer data.

- ❖ The technique is utilized for imaging a target based on employing scattering mechanism and Fourier Transform (FT).

- ❖ This Project aims to develop a GUI to obtain ISAR image of a target by applying several inputs and backscattered data as inputs.
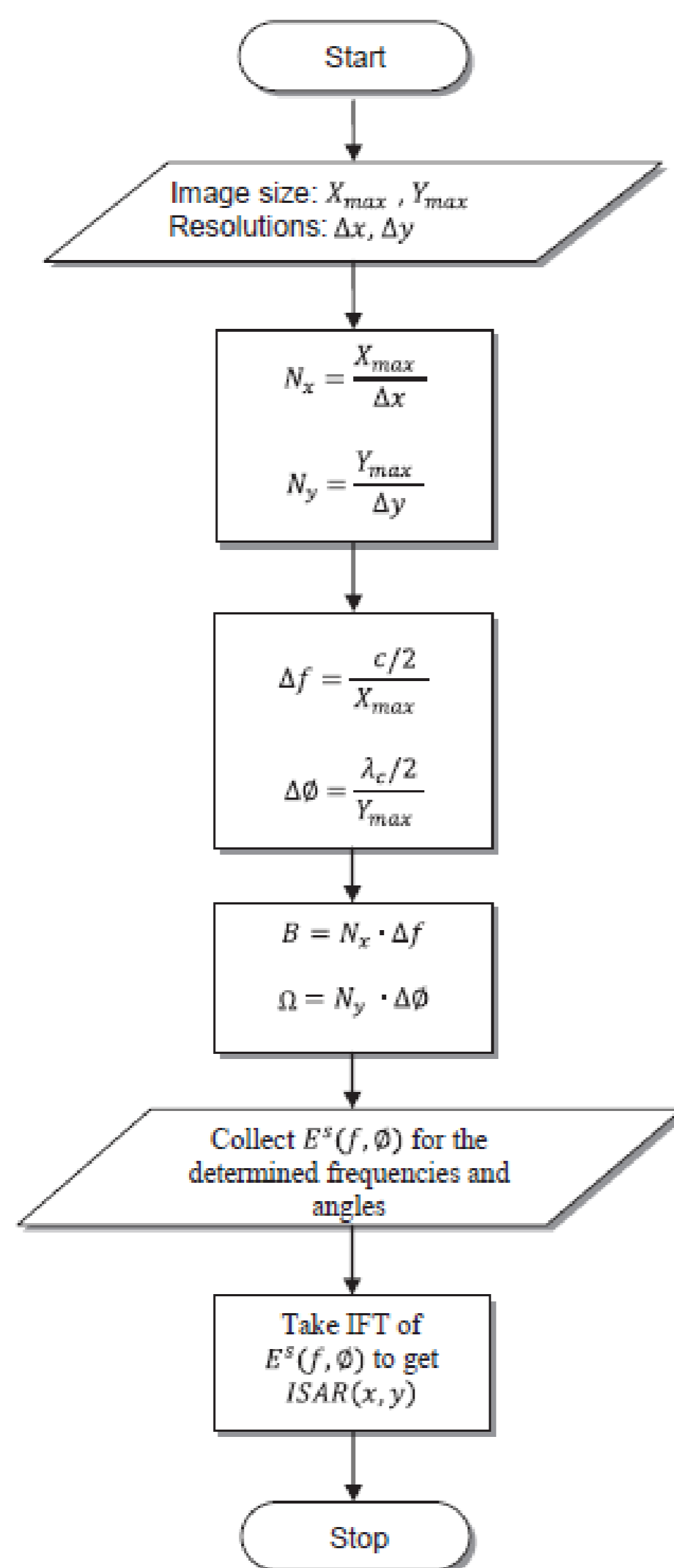
Methodology

Figure: Flowchart of basic ISAR Imaging Algorithm

- ❖ Backscattered electric field data are generated with EM Simulation Software such as CST, FEKO, HFSS and etc.
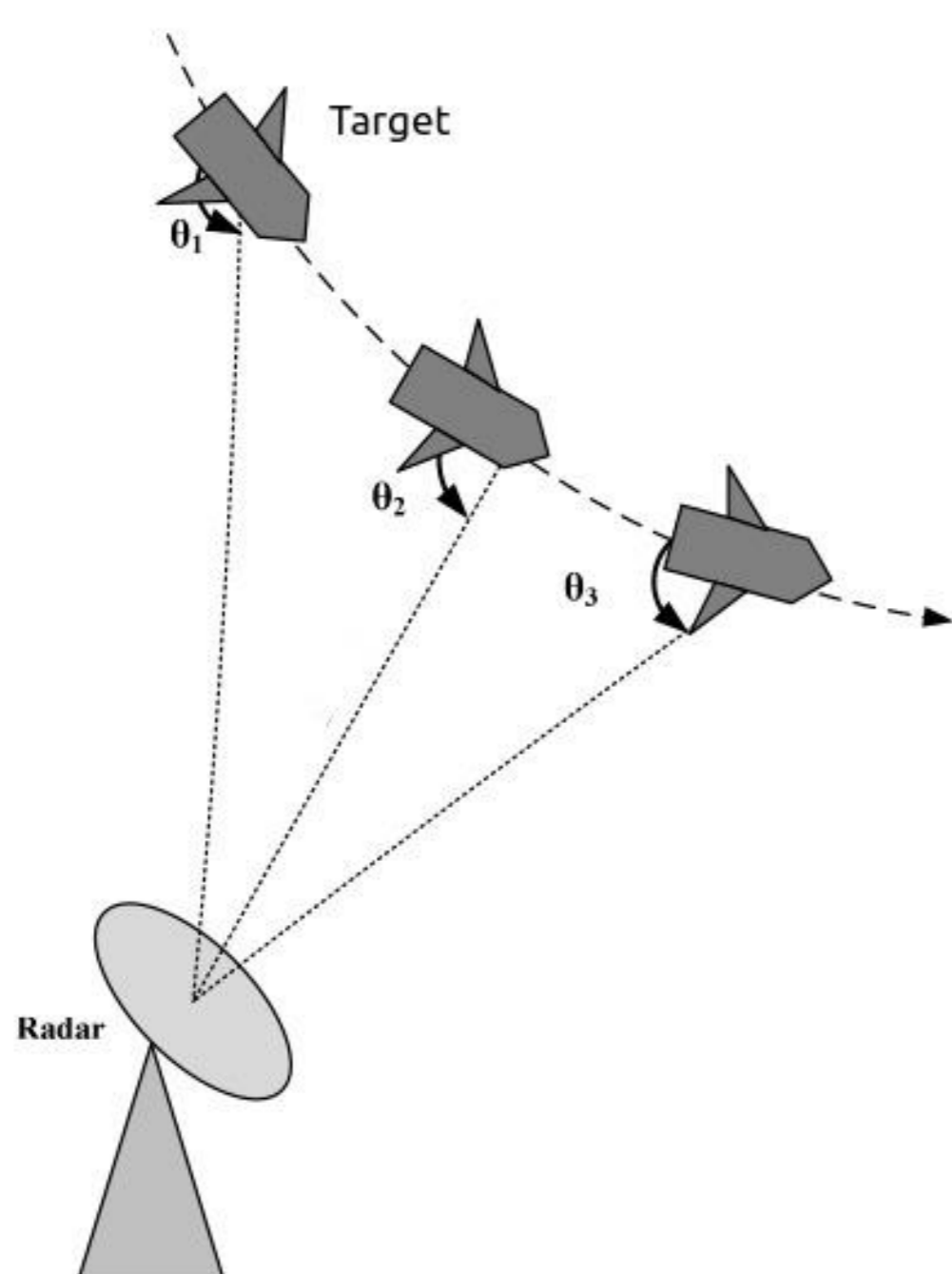- ❖ MATLAB is used for post-processing of the data to generate ISAR image using algorithms

Figure: ISAR Geometry

Application Areas

- ❖ Inverse synthetic aperture radar (ISAR) imaging is typically useful when there is a need to classify, recognize, or identify a moving target of interest.[1]

- ❖ ISAR image highlights two-dimensional (2-D) geometric features of a target, which can provide indications of target's type, size, and other salient information [2]
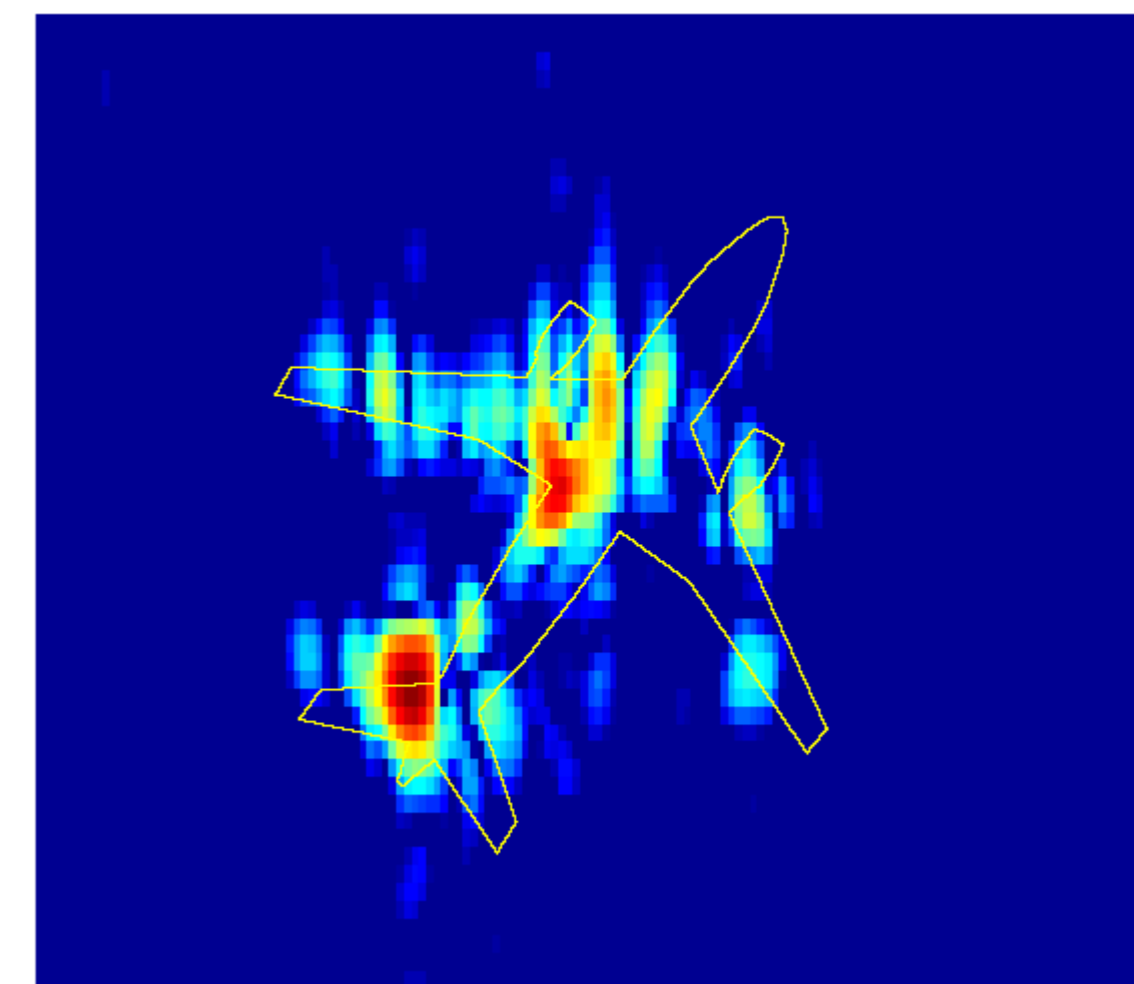

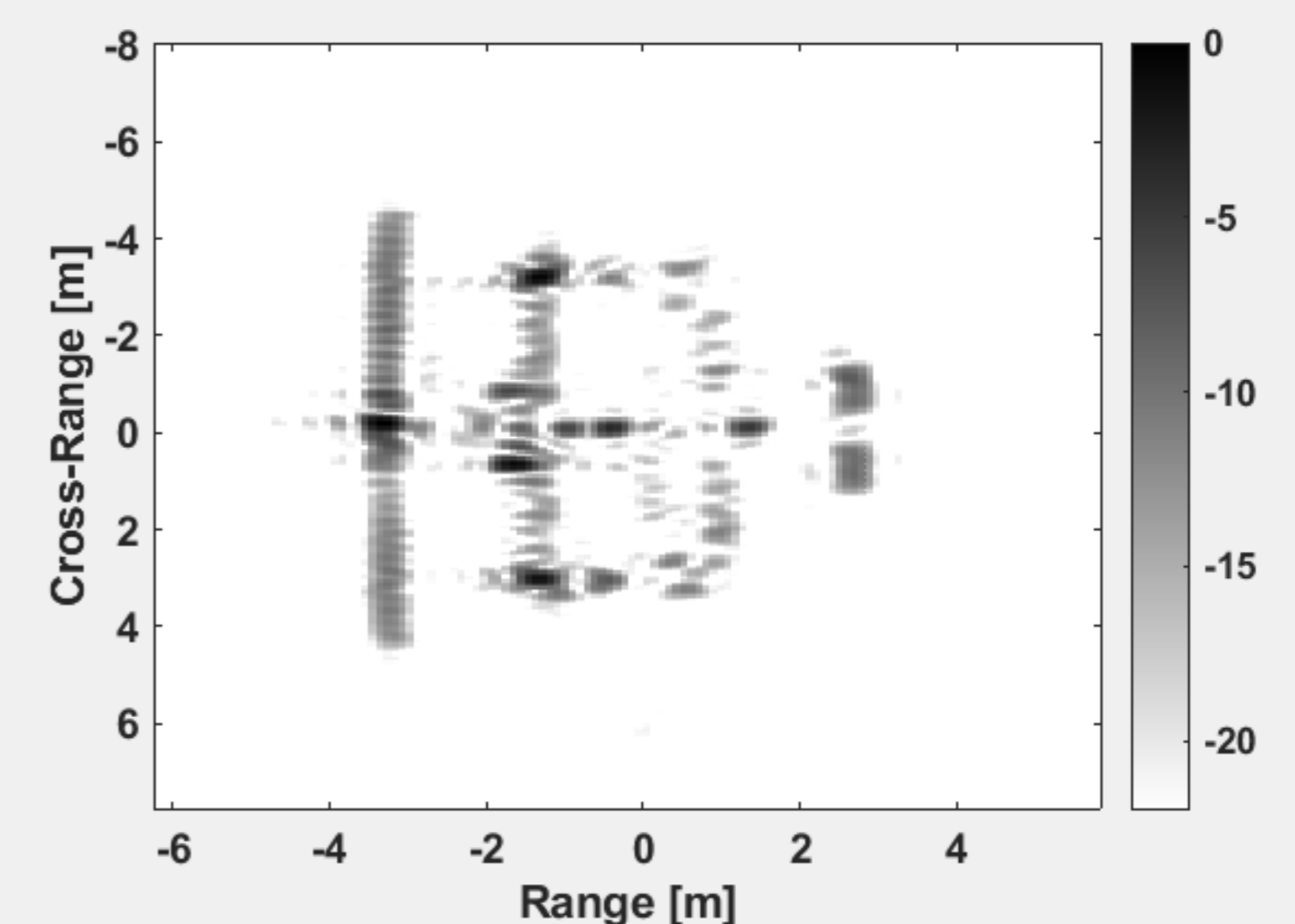*Figure: ISAR image of an aircraft*

Results and Discussion

- ❖ Phi angle is the azimuth angle and theta angle is the elevation angle between target and the radar.

- ❖ ISAR Image is displayed when the user enters inputs and clicks on the «Display ISAR Image» button.

- ❖ GUI is developed with MATLAB.

- ❖ Scattered Data is backscattered electric Field data that is N X M size table data.

- ❖ N and M are the number of discrete frequencies and number of distinct angles respectively obtained by RCS measurement of the target.

References

- [1],[2] Priyanka Shakya, 'Inverse Synthetic Aperture Radar Imaging Using Fourier Transform Technique'

Acknowledgements