Design of a Software Tool for Radar Cross Section Analysis of Simple Targets

Okan KOZAN 21693186

Hacettepe University Department Of Electrical and Electronics Engineering, Ankara 06800,Turkey

Instructor: Dr. Özlem Özgün

Abstract

Electromagnetic waves, with any specified polarization, are normally diffracted or scattered in all directions when incident on a target. In my project, we calculated the RCS calculations of objects with known shape as monostatic. These calculations have been presented to the user in a GUI design.

Introduction

A monostatic radar arrangement in which the transmitter and the receiver are located in the same place and usually form the same piece of radar equipment. This arrangement allows the transmitter to be synchronized with the receiver, and the timing method to measure the target range is simpler to implement.
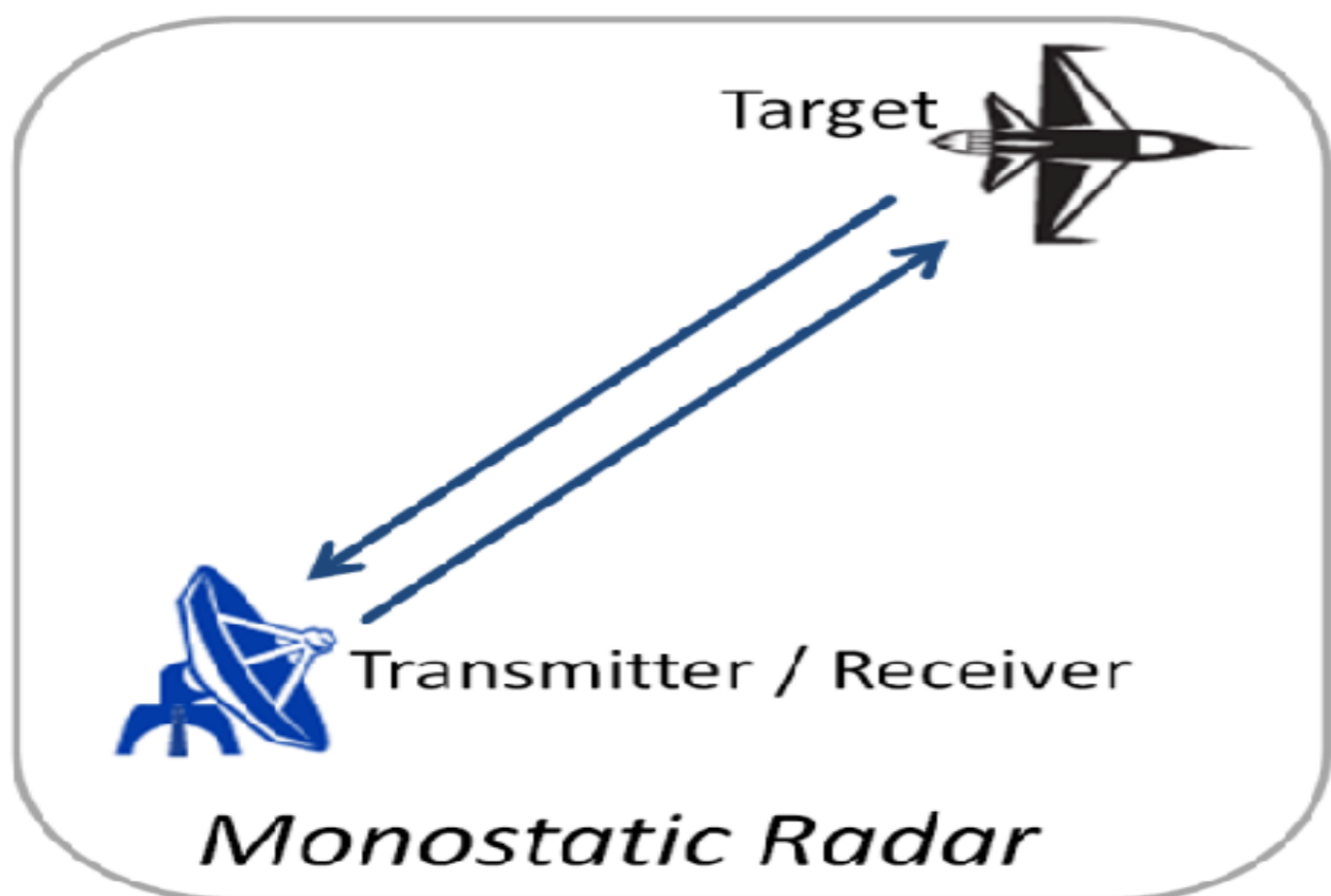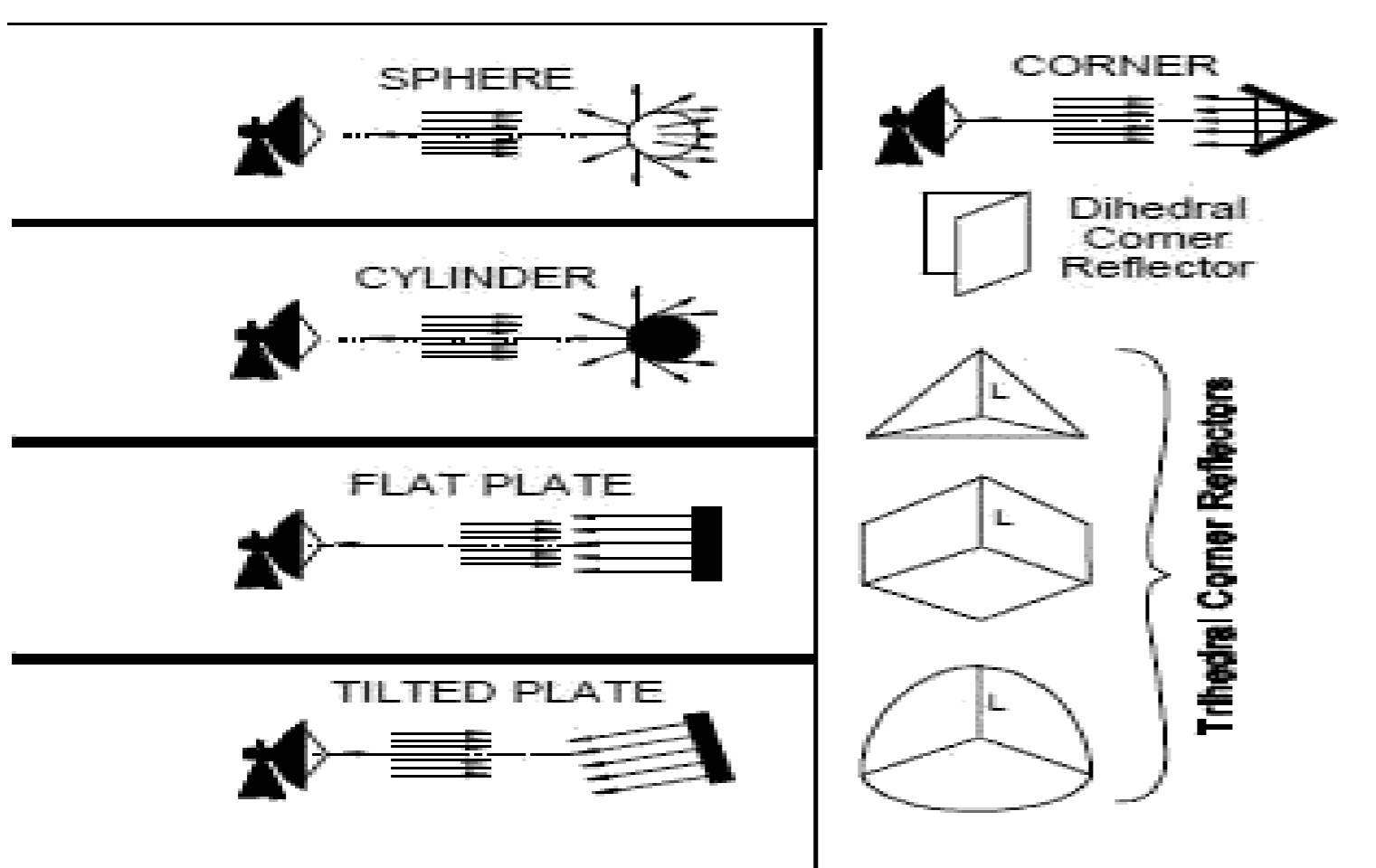

Figure-1: Monostatic radar

Figure-1:RCS of simple shapes

Implementation

The theoretical research required for the RCS calculation of simple shapes was done and the RCS values were plotted using MATLAB.

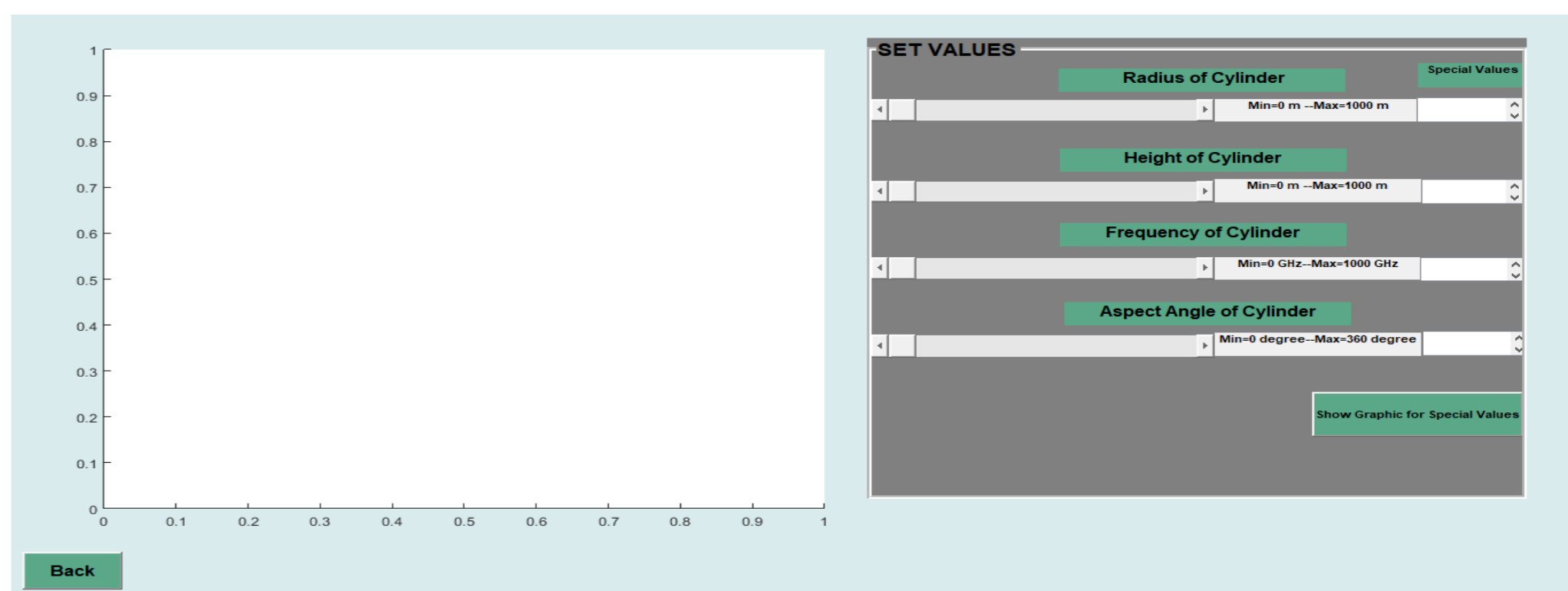The design in figure-3 has been improved to make the graphics more dynamic.

Figure-3: GUI design of RCS calculation of cylinder

- Sphere Monostatic
- Cylinder Monostatic
- Ellipsoid Monostatic
- Rectangular Monostatic
- Isosceles Monostatic
- Swerling Target Models And RCS Calculation

A interface has been designed to select the graphics of the above titles. A user login has been designed for this interface.
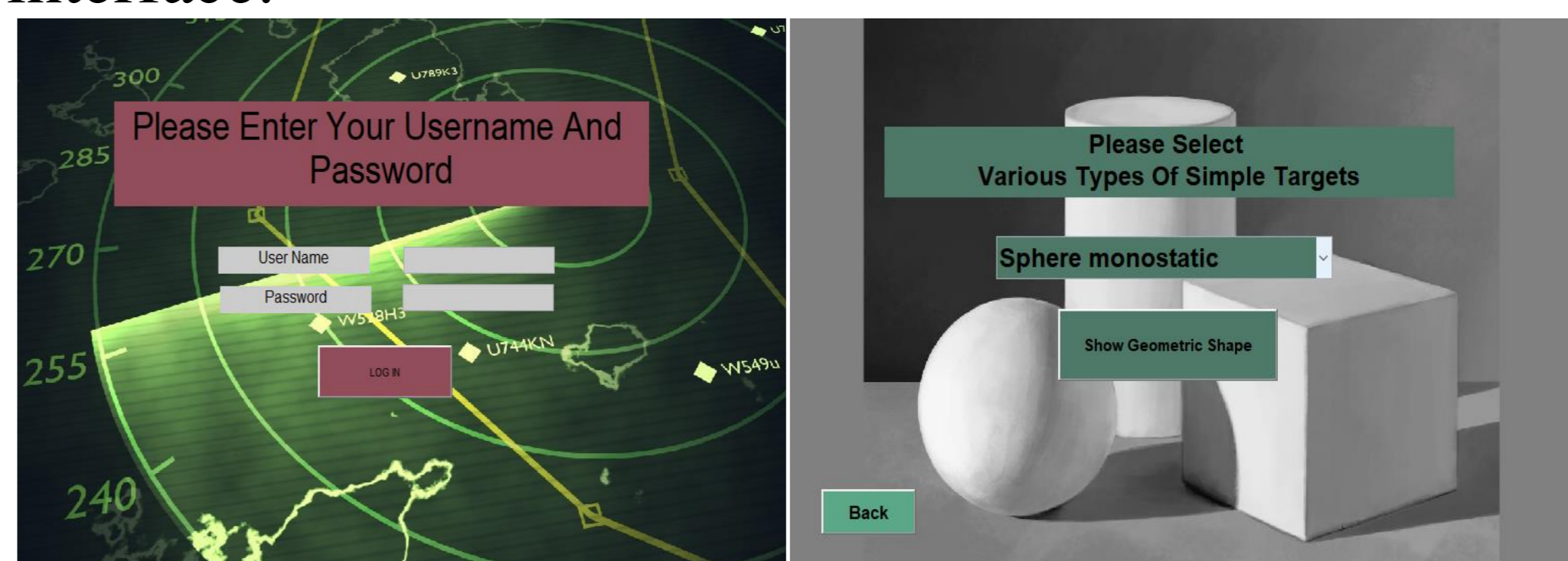

Figure-4: GUİ design

Conclusion

The user easily selects the type of target and enters the corresponding input parameters. The tool displays the geometry and calculated RCS values. It performs monostatic. The tool takes into account RCS fluctuations through probabilistic target models and shows us the Swerling patterns.

Acknowlegdment

I thank our advisor Dr. Özlem ÖZGÜN for her help.

References

1-'RADAR SYSTEMS ANALYSIS AND DESIGN USING MATLAB® THIRD EDITION BASSEM R. MAHAFZA deciBel Research Inc. Huntsville, Alabama, USA' /24.01.2021

2- https://www.mathworks.com/help/phased/ug/modeling-target-radar-cross-section.html /24.01.2021

https://www.mathworks.com/help/phased/ug/swerling-2-target-models.html/24.01.2021