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| --- | --- |
| Une image contenant intérieur, bleu, chaise, table  Description générée automatiquement | |
| **UE 6.1 – Status Report**  **Sparse RADAR Imaging Technique**  **FISE - 2021** | |
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# Introduction

The RADAR Cross Section is a measure that indicates how detectable an object is by a RADAR, and acts as an intrinsic electromagnetic signature to said object. The greater the RCS[[1]](#footnote-1), the easier to detect hence the constant consideration whether the object should be detected or should be stealthy. The RCS bears more information than just a surface, and given the right data, it can be used to classify and identify aircrafts, ships, and so on.

With an anechoic chamber, we have optimal conditions to fully quantify the RSC of an object according to the RADAR’s operating frequency, and the angle at which the RADAR’s beam hits the object. Given the data given by the Vector Network Analyser, and using classical operations such as Fourier’s Transform, we can create a 3D representation of the object. Such techniques are known and used since the 1980’s. [1]

Yet, the aforementioned techniques can provide only moderate quality results. This project aims at implementing a version of the Sparse Radar Imaging Technique (SPRITE), watered-down to 2D, that should give us better results. The sparse approach gives us access to new algorithms, and allows us to take less measurements, which is a plus considering how tedious acquiring them is.

In the first chapter, I will mention a few notions that are essential in order to comprehend the methods and results. Then, I will emphasize on the data acquisition process, to conclude with the existing imaging techniques and comparison to SPRITE[[2]](#footnote-2)

# Required notions

Before dwelling into how to generates images from RCS measurements, we have to remind ourselves of a few basic principles and results.

## RADAR

### History of the Radar

### Basic principle

### Radar Equation

## RCS

## RCS Imaging

## Sparsity

# Measurements acquisition

## Anechoic chamber

## Antennas and frequency range

## Vector network Analyser

## Limits

# Sparse RADAR Imaging Technique

# Travaux cités

|  |  |
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| [1] | D. L. Mensa, High Resolution Radar Cross-Section Imaging, Boston: Artech House, 1991. |
| [2] | S. Bucuci, High resolution RCS imaging in anechoic chamber by introducing a random medium, Rennes, 2017. |

1. Radar Cross Section [↑](#footnote-ref-1)
2. SParse Radar Imaging TEchnique [↑](#footnote-ref-2)