**Data Documentation for Monostatic microwave imaging setup that includes the characterization of the field radiated by the Tx/Rx antennas**

**General Information**

This dataset corresponds to the measurements of a monostatic microwave imaging system, collected using the facility described in [1].

The first dataset, "Escatt\_meas.zip", corresponds to the field scattered by the targets shown in the picture. Two targets were considered: a 18 cm long × 14 cm diameter metallic can, and a 18 cm diameter and 4 cm thick plastic disk, placed 22 cm above the metallic floor of the facility. The size of the scattered field acquisition domain was Lx × Ly = 65 cm × 40 cm, discretized every δx,y = 10 mm (λ/2 at the center frequency of 15 GHz), and placed 1 m above the floor of the measurement facility. The Tx and Rx antennas were two Standard Gain Horn (SGH) horn antennas [2].

The second dataset, "Erad\_horn.zip" is the near field radiated by the Tx and Rx Standard Gain Horn (SGH) antennas in the 12-18 GHz frequency band. The field radiated by these antennas was measured in the same 12-18 GHz frequency band, in an acquisition domain discretized also every 10 mm, placed 50 cm above the SGH aperture. The field radiated by the SGH was processed using the backward transformation algorithm described in [3] to obtain the SGH aperture fields

This dataset can be processed following the methodology described in [4],[5] (modified Delay-and-Sum algorithm) and in [6] (modified Fourier-based imaging algorithm).

[1] A. Arboleya, Y. Alvarez, and F. Las-Heras, “Millimeter and submillimeter planar measurement setup,” in 2013 IEEE Antennas and Propagation Society International Symposium (APSURSI), 2013, pp. 1–2.

[2] (2022, 8) Specifications of the standard gain horn antenna SGH 639 from Narda. [Online]. Available: https://nscainc.com/wp-content/uploads/pdf/NARDA\_640.pdf

[3] J. Hanfling, G. Borgiotti, and L. Kaplan, “The backward transform of the near field for reconstruction of aperture fields,” in 1979 Antennas and Prop. Society Intl. Symposium, vol. 17, 1979, pp. 764–767.

[4] Y. Alvarez Lopez and F. Las-Heras, “On the use of an equivalent currents-based technique to improve electromagnetic imaging,” IEEE Transactions on Instrumentation and Measurement, vol. 71, pp. 8004113, 2022.

[5] Y. Alvarez Lopez, J. Laviada, A. Arboleya, and F. Las-Heras, "A backpropagation imaging technique for subsampled synthetic apertures," IEEE Transactions on Instrumentation and Measurement, vol. 72, pp. 4502316, 2023.

[6] Y. Alvarez López and F. Las-Heras Andrés, "Improved Methods for Fourier-based Microwave Imaging," Sensors, Vol. 23, pp. 9250, 2023.

**Name of dataset:**

Monostatic microwave imaging setup that includes the characterization of the field radiated by the Tx/Rx antennas

**Name of data files in data set:**

“Erad\_horn.zip”

“Escatt\_meas.zip”

“plotMeasurements.m”

“PictureSetup.png”

**Dataset language:**

English

**Date the data set was last modified:**

17 November 2023

**Funder:**

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**How to cite data:**

Yuri Alvarez Lopez, Fernando Las-Heras Andrés, January 31, 2023, "Monostatic microwave imaging setup that includes the characterization of the field radiated by the Tx/Rx antennas", IEEE Dataport, doi: <https://dx.doi.org/10.21227/2dbm-qc30>.

**Methodology for data collection:**

Please refer to the description given in the general information.

**Data collector(s):**

Yuri Álvarez López (alvarezyuri@uniovi.es)

**Date of data collection:**

Measurement campaign conducted in July 2022.

**Person to contact with questions:**

Yuri Álvarez López (alvarezyuri@uniovi.es)

**Data entry:**

17 November 2023

**Software (including version #) used to prepare data set:**

Matlab (any version from 2012a onwards is compatible to run the \*.m script for data visualization)

**Data processing that was performed:**

Please refer to the description given in the general information. No specific data processing was conducted.

**Variables**

For each measurement (\*.txt files):

Column 1: x coordinate, in m  
Column 2: y coordinate, in m  
Column 3: real part of the measured S\_21 parameter (V/m)  
Column 4: imaginary part of the measured S\_21 parameter (V/m)

**File Overview**

“Erad\_horn.zip” ZIP file containing the near field radiated by the horn antenna (more precisely, the S\_21 parameter, which is proportional to the measured electric field). The ZIP file has 201 \*.txt files, one \*.txt file per frequency (the frequency value, in MHz, is indicated on the name of each \*.txt file)

“Escatt\_meas.zip” ZIP file containing the field scattered by the targets in the imaging domain (see the image “PictureSetup.png”). The ZIP file has 201 \*.txt files, one \*.txt file per frequency (the frequency value, in MHz, is indicated on the name of each \*.txt file)

“plotMeasurements.m” Matlab script to import the \*.txt files (after decompressing the ZIP files) and plot the measurements

“PictureSetup.png” Picture of the measurement setup