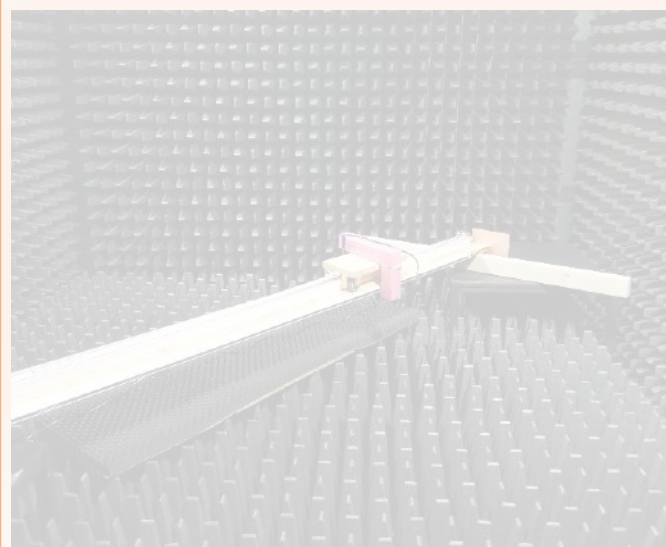
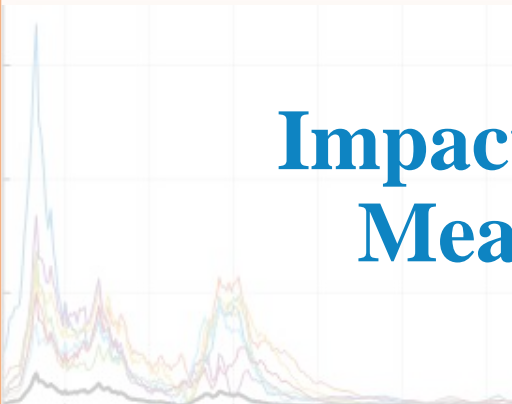




Impact Reduction of Common Mode Currents for Field Measurements on a Meandered Monopole Antenna

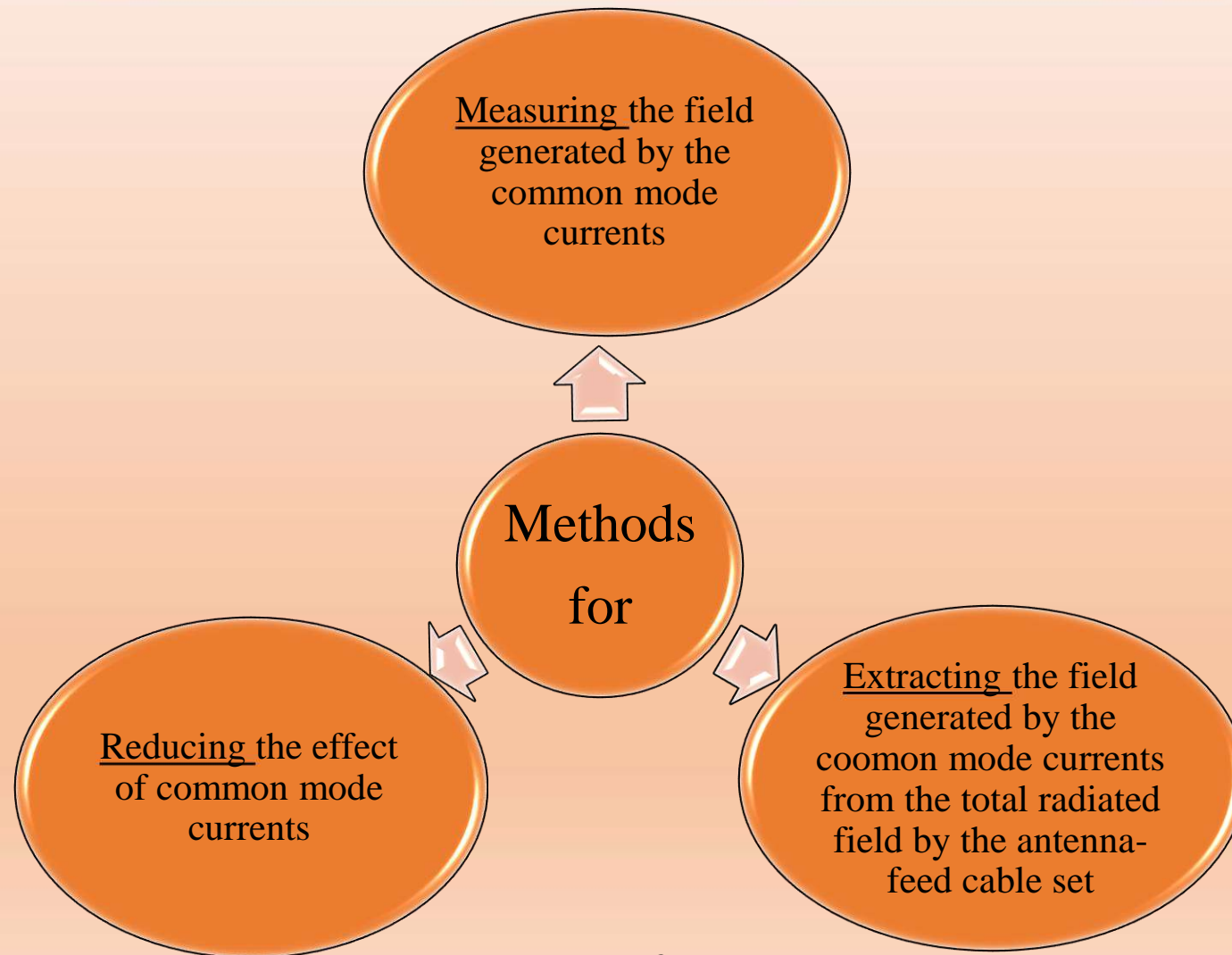


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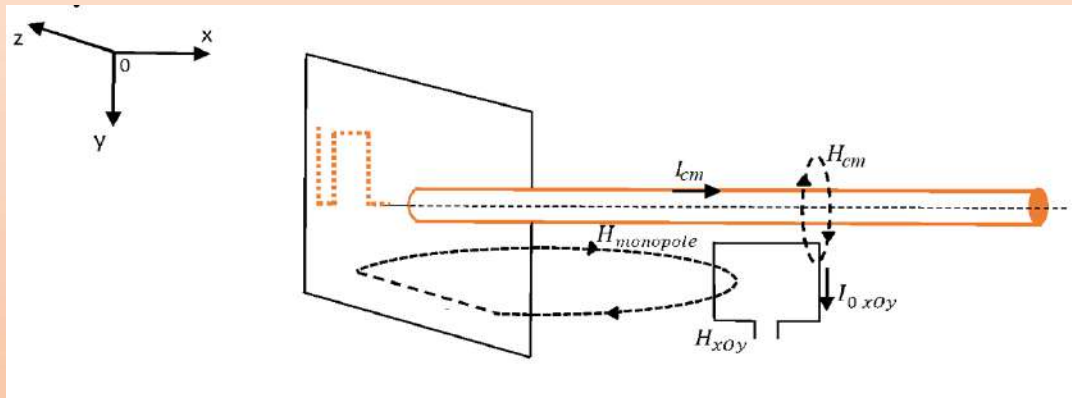


INTRODUCTION



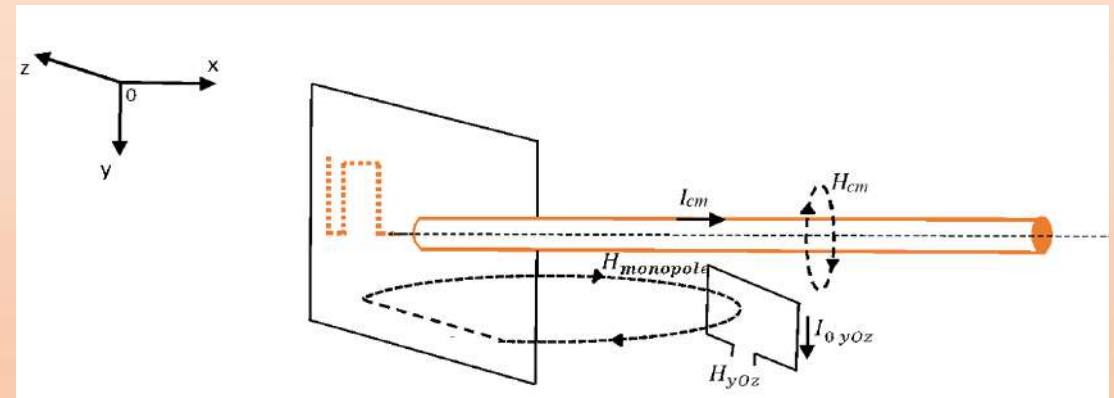
PROPOSED APPROACH

We considered as an antenna under test (AUT) a small meandered monopole antenna fed through a coaxial line, and as a probe we employed a square loop antenna. The two-antenna system was placed in an anechoic chamber and the scattering parameters were measured using a vector network analyzer (VNA).



Magnetic field components through the PA for xOy polarization measurements (configuration 1)

$$H_{xOy} = H_{cm} + H_{monopole}$$



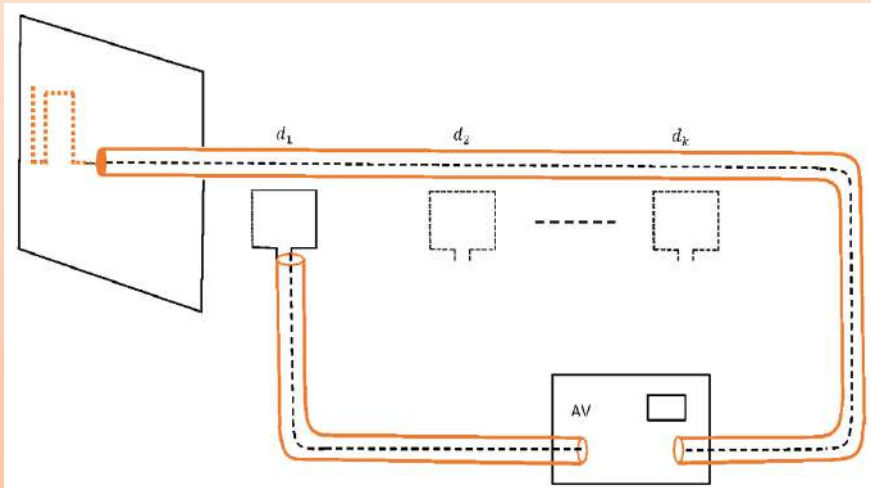
Magnetic field components through the PA for yOz polarization measurements (configuration 2)

$$H_{yOz} = H_{monopole}$$

$$H_{cm} = H_{xOy} - H_{yOz}$$

PROPOSED APPROACH

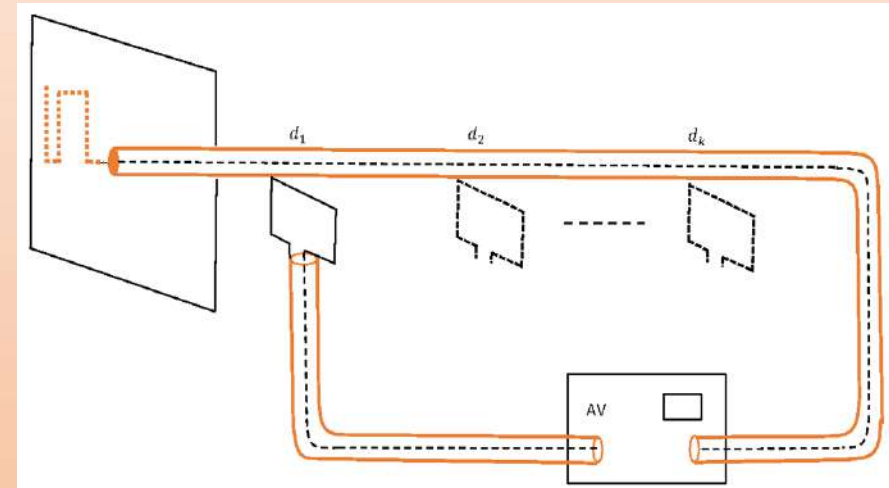
In order to apply the distance averaging method, the transfer functions for the two configurations must be measured. The loop antenna will be placed on a mobile, controlled platform; the mobile platform will move the PA at N distances away from the AUT for both configurations.



Distance averaging method for xOy polarization (configuration 1)

$$\bar{S}_{21cm} = \sum_{k=1}^N \frac{d_k}{d_0} \exp(jk_0 d_k) S_{21cm}^{d_k}$$

$$\bar{I}_{0cm} = \frac{V_g |\bar{S}_{21cm}|}{2R_0}$$



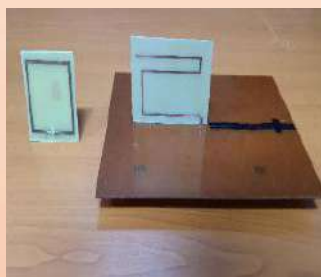
Distance averaging method for yOz polarization (configuration 2)

$$\bar{H}_{cm} = \sqrt{\frac{R_0 \bar{I}_{0cm}^2}{\eta A_e}}$$

$$H_{xOy}^{d_k} = \frac{d_k}{d_0} \exp(-jk_0 d_k) \bar{H}_{xOy}$$

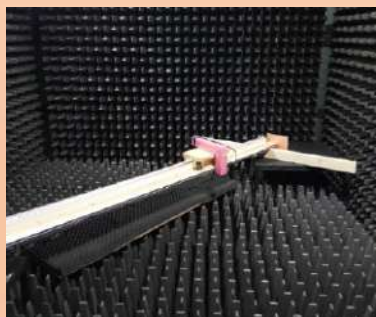
RESULTS

- The AUT was a meandered monopole antenna with a ground plane of 118×177 mm in size. The PA was a square loop with a side length of 4 cm. Both antennas were connected to a vector network analyzer (VNA). The measurements were performed in an anechoic chamber with inner dimensions $H \times W \times D$ of $2.050 \times 2.575 \times 2.575$ m.



a)

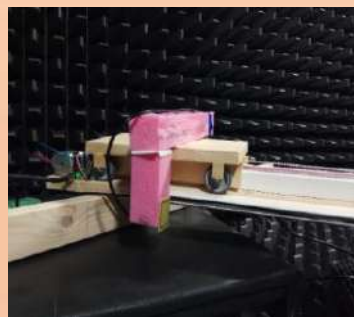
- For each configuration, the measurements were performed at distances between 21 and 71 cm with a pitch of 2 cm and for frequencies between 300 MHz and 800 MHz. In order to apply our method, the measured data were processed with a MATLAB code.



b)



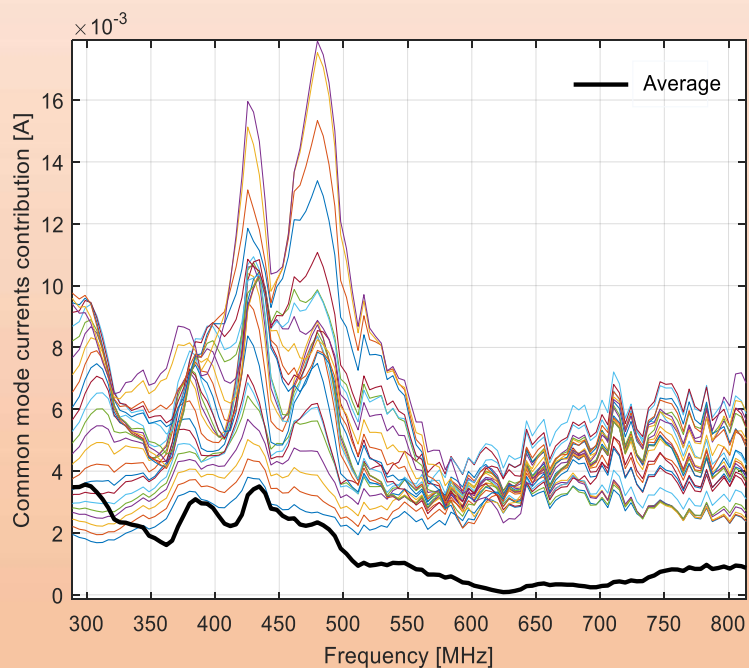
c)



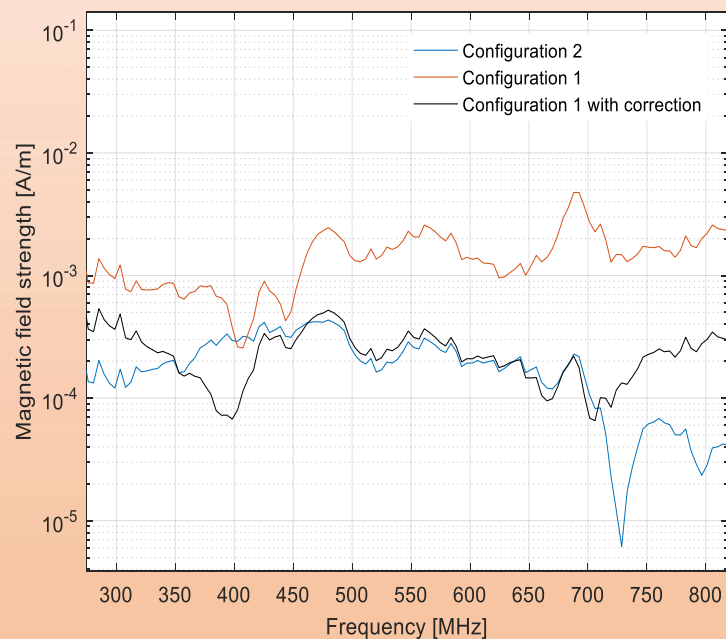
d)

Measuring setup: (a) loop and meandered monopole antennas; (b) two-antenna system mounted on the mobile platform; (c) configuration 1; (d) configuration 2.

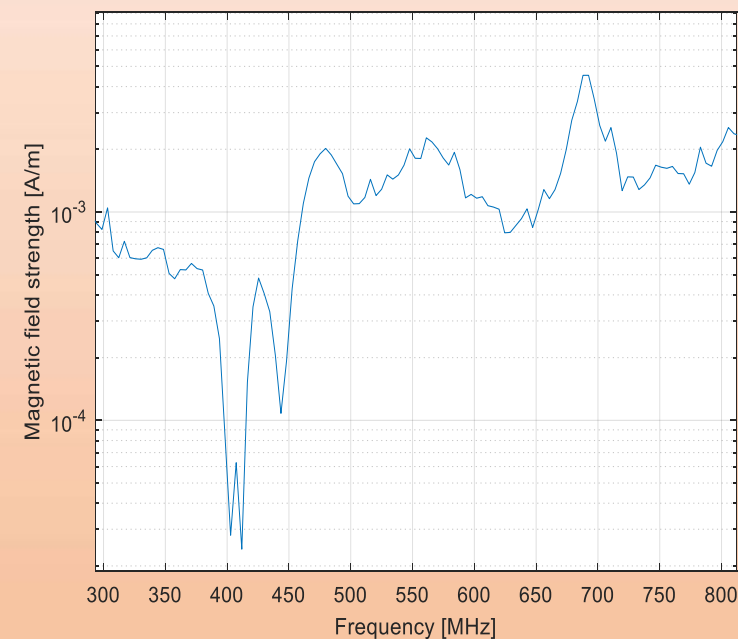
RESULTS



Contribution of the common mode current to the output current versus distance average value



a) Magnetic field measured for configuration 1, with and without correction, and for configuration 2; (b) Magnetic field generated by the common mode currents





Thank you for your attention!

Any questions?

