



PhD thesis 2017-2020

Novel adaptive antenna characterization techniques

Host Laboratory : Institut d'Électronique et des Télécommunications de Rennes (IETR), UMR CNRS 6164, Université de Rennes 1, France

Context :

Antenna characterization techniques are evolving from both the field sampling point of view and the post-processing. They must answer to always more demanding requirements: (i) extension of the frequency band, (ii) increasing of the measurement accuracy and (iii) reduction of measurement time. This last point is of uppermost industrial importance. Up to now, most measurement techniques require a regular field sampling leading to important characterization time.

Goals : One way to reduce the characterization time would be to smartly acquire the radiated field patterns by adapting the field sample positions. Thus, by coupling a reduced number of field samples smartly distributed to an adaptive field interpolation scheme, it must be possible to characterize a pattern in a reduced time.

The goal of this thesis is to propose several characterization procedures enabling to reduce the number of field sampling points according to the desired accuracy. The CNES and IETR have several measurement facilities both in near field (spherical and planar) and far field (compact antenna test range or line of sight configuration) covering a wide frequency band. These facilities will be used to experimentally validate the proposed procedures.

Description of the work : The PhD research work encompasses the following steps :

- 1) State of the art on measurement techniques according to the type of facilities (spherical or planar, near or far field). A special focus will be done on sampling and interpolation schemes.
- 2) Development and implementation of several fast measurement procedures according to the type of characterization and measurement facility.
- 3) Application and comparison of the proposed procedures on several antennas numerically simulated for various configurations.
- 4) Experimental validation on the measurement facilities of the proposed procedures in the CNES and IETR facilities for several antennas working in different frequency bands.

PhD starting date: October 2017. Duration : 36 months

Candidat: Master 2 (or equivalent) in signal processing / applied mathematics.

Supervision :

CNES : Dr. Romain Contreres et Dr. Gwenn Le Fur

Université de Rennes 1 - IETR : Dr. Benjamin Fuchs, Prof. Bernard Uguen and Dr. Laurent Le Coq

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