NEAR FIELD ANTENNA MEASUREMENT TECHNIQUES : CURRENT STATUS AND FUTURE TRENDS

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The use of Near Field techniques for antenna measurements is becoming more and more popular. While they suffered, during a long time, from an apparent complexity resulting from the need of a Near-to-Far Field transformation, recent advances in both software and equipment make them now very well recognized for their accuracy and flexibility. Indeed, Near-to-Far Field transformations are now very efficiently conducted, even with regular computer power. Furthermore, the major drawback of Near Field techniques, which consisted in the slowness of the measurement procedure, is now spectacularly overcome thanks to the use of probe arrays. Today, the Near Field approach appears as a very efficient way for obtaining a maximum of information from a minimum number of measurements. Indeed, the Near Field data measured on a surface surrounding the antenna under test allow to retrieve the radiated field, not only, everywhere outside the measurement surface, but also, with some precautions, inside this surface. Initially devoted to large antennas, Near Field techniques appear as an attractive tool for rapid measurements on small antennas. More generally, as compared to direct measurement techniques involving long or compact ranges, they are much less space demanding and, consequently, they require smaller investments.

This paper reviews the basic features of standard Near-Field techniques based on a modal expansion of the radiated field and provides a comprehensive comparison with direct measurements methods. Then, the most recent developments are reported. More prospectively, the expected evolution of Near Field techniques is addressed. Three major aspects are considered. Firstly, the most promising “phaseless” reconstruction algorithms will be presented. Such algorithms are required when phase measurements are either difficult (mm and sub-mm waves) or impossible (modulated signals, spurious emissions, etc…). Secondly, the impact of using inverse source algorithms instead of modal expansions will be discussed. Such algorithms have been shown to relax some constraints on the number of measured data and the truncation of the measurement surface. Finally, the possible impact of new generations of low-invasive sensors, suitable for Very Near field measurements, will be analyzed. As a conclusion, the extension of Near-Field techniques to other applications will be briefly presented.

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