Rancang bangun perangkat lunak pengukuran karakteristik antena dengan metode medan dekat planar dengan mempertimbangkan faktor koreksi probe = Software development for planar near field measurements with probe correction compensation

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Abstrak

Pengukuran medan dekat merupakan salah satu metode pengukuran karakteristik antena. Ada tiga macam pengukuran medan dekat, yaitu planar, silindris, dan bola. Diantara ketiga metode tersebut, metode planar merupakan metode yang mempunyai bentuk matematis yang sederhana sehingga mudah diimplementasikan dalam pemograman. Dalam pengukuran medan dekat metode planar, data medan dekat antena tes diambil oleh antena probe ketika antena tes berada pada wilayah radiasi medan dekatnya. Data medan dekat tersebut akan ditransformasikan ke data medan jauh sehingga didapat pola radiasinya. Pengukuran medan dekat metode planar dengan koreksi probe, tidak hanya mengambil data medan dekat dari antena tes tetapi juga data medan jauh dari antena probe.
Secara matematis pengukuran medan dekat metode planar dengan koreksi probe merupakan fungsi gabungan dari hasil bentuk fourier data medan dekat dan fungsi invers dari data medan jauh antena probe. Program transformasi medan dekat ke medan jauh (NF-FF) telah dibandingkan hasilnya, baik dengan electromagnetic (EM) simulator yang komersil maupun pengukuran secara langsung.
Hasil perbandingan medan jauh dari hasil transformasi dengan EM simulator menunjukkan nilai penyimpangan rata-rata 1.25 dB. Selanjutnya, perbandingan antara medan jauh pengukuran secara langsung dan hasil transformasi tanpa mempertimbangkan faktor respon probe diperoleh nilai penyimpangan sebesar 9.33 dB. Adapun hasil transformasi dengan mempertimbangkan faktor respon probe berhasil memperbaiki nilai penyimpangan menjadi rata-rata 4.4 dB.
<hr><i>Near field measurement is one method to measure antenna performance. There are three methods to measure near field antenna; they are planar, cylindrical, and spherical methods. The simplest method for near field measurement is the planar method because its simplicity in the mathematical form and implementation in programming. The planar near field method receives near field data with near field antenna distance. The near field data will be transformed into far field data to get the antenna performance. The transformation from near field to the far field data is achieved by using Fast Fourier transform (FFT). The function of planar near field antenna measurement with probe correction or namely coupling function is equal to the product of the far field transformation with the far field probe correction simulation. The antenna coupling function consists of far field antenna under test (AUT) and data far field of the probe.
In this paper we will discuss about the probe correction effect in the planar near field antenna measurement and the computation of algorithm scheme for planar near field measurements with probe correction. The software development near field to far field (NF-FF) transformation was compared with simulation and measurement result. First, the developed software was compared between NF-FF transformation with far field electromagnetic (EM) software simulator.
The comparison between EM simulator and the developed software for the radiation pattern Ef=0 shows an average error of 1.25 dB. Second, the comparison between measured far field and transformation without

probe correction, this shows an average error of 9.33 dB, and at last with probe correction, shows an improvement with average error of 4.4 dB.</i>