3rd URSI AT-AP-RASC, Gran Canaria, 29 May – 3 June 2022

Historical UHF Yagi-Uda Antenna Measurements compared to Computational Modeling

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1 Extended Abstract

Antennas are designed by scientists and engineers based on electromagnetic (EM) theory and a rich literature of past experience. The emergence of advanced, affordable computing have allowed for the implementation of sophisticated computational electromagnetic modeling (CEM) softwares. Modern scientists, or engineers, now make use of these tools to assess a design before construction and optimize it further. An experiment is under consideration for a long term observation of the Deuterium radio line observation in the Milky Way and in nearby galaxies. After a study on the front end system, Yagi-Uda antennas were pre-selected for this experiment and CEM was used predominantly to validate the design. Computational modeling was important in this case since conditions for practical measurements could not be met. The antenna was built to respond at a frequency of 327.4 MHz and a large amount of real estate with no obstructions in the field of view is needed for far field measurements while near field measurements need a large scanner and an anechoic chamber. However it was important to confirm the CEM tool's predicted performance with real measurements, to increase confidence in the modeling. In 1976, Peter Viezbicke from the National Bureau of Standards (NBS) of the U.S Department of Commerce published a technical report on Yagi-Uda antenna design [1]. The NBS report recorded the measurements on a number of Yagi-Uda antennas ranging from 0.4λ to 4.2λ in length, including measurements of small arrays of Yagi-Uda antennas. A number of structural aspects of the antennas are assessed such as: cross sectional area, various reflectors, and overall length. FEKO is the commercial computational EM code that was used for this work.

References

[1] P. Viezbicke, "Yagi Antenna Design."*National Bureau of Standards*, 1976.

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