Comment on Special Sections on Diffraction

In two recent issues of the *Antennas and Propagation Magazine* (specifically, Volume 55, No. 3, June 2013, and Volume 55, No. 4, August 2013), the history of diffraction and the associated chief contributors/scholars to same were impeccably presented.

However, the interesting original work on APO (Asymptotic Physical Optics) by W. V. T. Rusch [1] and its extension by C. M. Knop [2], and on CAPO (Corrected Asymptotic Physical Optics) by C. M. Knop and E. L. Ostertag [3, 4], as applied to a paraboloid antenna, was overlooked. This work was later independently examined and thoroughly summarized by P. J. I. de Maaagt, J. Chen, and M. H. A. J. Herben [5], and shown to agree with Kouyoumjian and Pathak's modified UTD.

Basically, the APO work [1] employed a "second kind" asymptotic integration of the PO fields on the reflector as produced by the incident horn/subreflector fields. This solution had (like J. B. Keller's original GTD work [6]) a singularity at the shadow boundary. A more accurate asymptotic integration [2] removed this singularity. However, comparison with measurements showed that this solution disagreed with measurements in the back region (e.g., for the paraboloid studied in [3, 4], by up to 6 dB for $130° \leq \theta \leq 175°$). This error was removed by the expedient of multiplying the APO diffraction coefficients of [2] by the ratio of the exact Sommerfeld solution to the APO solution of a half-plane giving the CAPO coefficients [3, 4].

This CAPO procedure gives numerical results for this paraboloid case identical to those of the modified UTD [5]. However, it does not give a physical picture of the diffraction phenomenon as does modified UTD.

References

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2. C. M. Knop, "An Extension of Rusch's Asymptotic Physical Optics Diffraction Theory of a Paraboloid Antenna," *IEEE Transactions on Antennas and Propagation*, **AP-23**, 1975, pp. 741-743.

3. C. M. Knop and E. L. Ostertag," A Note on the Asymptotic Physical Optic Solution to the Scattered Fields from a Paraboloidal Antenna," *IEEE Transactions on Antennas and Propagation*, **AP-25**, 1977, pp. 531-534.

4. C. M. Knop and E. L. Ostertag, "Correction to 'A Note on the Asymptotic Physical Optic Solution to the Scattered Fields from a Paraboloidal Antenna'," *IEEE Transactions on Antennas and Propagation*, **AP-25**, 1977, p. 912.

5. P. J. I. de Maagt, J. Chen and M. H. A. J. Herben, "A Review and Comparison of Some Asymptotic Techniques for Calculating the Wide-Angle Radiation Pattern of Paraboloid Reflector Antennas," *Electromagnetics*, **12**, 1, 1992, pp. 57-75.

6. J. B. Keller "Geometric Theory of Diffraction," *Journal of the Optical Society of America*, **52**, 1962, pp. 116-130.

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Guest Editors' Reply

We would like to thank Dr. C. M. Knop for pointing out some additional references. No doubt, there are many more references that we could have included. Those mentioned in the special sections were only representative. We believe the cited references in the special sections do additionally refer to many other outstanding references, and we encourage the readers to review them.

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