NEC - Reflector Antenna Code
NEC-REF Version 3.1

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The NEC Reflector Antenna Code developed at The Ohio State University ElectroScience Laboratory has been widely used in the antenna community for the analysis and design of the reflector antenna. This computer code has the capability for both near-field and far-field computation for reflector antennas with paraboloidal surfaces. Both center-fed and offset reflector can be analyzed by this program. A key feature of the code is its capability for a general reflector rim shape.

Since the last release of this computer code, many new capabilities such as Cassegrain and Gregorian dual reflector antennas have been added to the program. In addition to the new capabilities, the computer program has also been re-structured such that it can be executed in a more user-friendly fashion. The user's manual documents all the capabilities of the code and describes the operation of the updated version of the Reflector Antenna Code.

Some key capabilities of the original NEC Reflector Antenna Code are summarized as follows:

- A general reflector rim shape may be used (piecewise linear). Irregular or jagged shapes may not work because of complicated shadowing of the spillover fields and complicated limits for the AI.
- The required input data for the feed pattern is minimized by piecewise linear pattern fitting. The feed may be linearly polarized with any orientation or circularly polarization.
- A feed pattern option is available for a dominant mode horn feed (either corrugated or smooth) in which the horn dimensions are input.
- Storage and computation time of aperture data for AI is minimized by using a principal rectangular grid and interpolation of the aperture field.
- The combined AI/GTD approach gives full pattern capability for both far-field and near-field data.
- The efficiency of field computations is maximized by the use of GTD for wide pattern angles and the use of the rotating grid method for far field computations at small angles (main beam region).
- Feed blockage is simulated by a physical optics model of a rectangular or a circular disk.
- Scattering from feed struts with circular cross section and piecewise linear axes can be modeled.

- Direct input of linearly polarized aperture field distribution. No feed pattern is then required.
- Near zone plate scattering effects on the far zone patterns of reflector antenna can be analyzed.

Some new capabilities of the updated OSU Reflector Antenna Code and its associated commands are summarized as follows:

- A multi-point GTD method is used to improve the calculation efficiency on the wide angle sidelobes of the reflector.
- An extended aperture integration (AIE) is implemented to improve the accuracy of aperture integration for offset reflector antennas.
- The radiation patterns of Cassegrain and Gregorian dual-reflector antennas can be calculated.
- Complete patterns of horn antennas with circularly symmetric geometry can be calculated by using the moment method approach.
- The patterns of reflector antennas with array feeds or defocussed feeds can be calculated.
- Feed scattering effects can be calculated for offset reflectors by the Extended Aperture Integration method.
- Struts with general cross section can be modeled.
- Direct feed incidence on the struts is included.
- Surface tolerance effects on the reflector patterns can be modeled.

NEC-REF Version 3 is no longer export controlled though its distribution is required through The Ohio State University. The code is supplied as a PC executable for Windows 3.x, 95, NT and up. The possibility of other formats can be discussed with the developer.