NASA TECH BRIEF

Computer Programs for Antenna Feed System Design and Analysis

Fourteen computer programs have been developed for antenna feed system design and analysis. The programs cover a large spectrum of feed design problems, from primary feed pattern synthesis to the far-field pattern of the main reflector, including analyses of structural distortions. The programs are:

(1) Multimode Feed Pattern Synthesis
(2) Cassegrainian Synthesis
(3) Plotting Program
(4) Data Conversion (I)
(5) Subreflector Program
(6) Scattering of an Arbitrary Spherical Wave by an Arbitrary Surface of Revolution
(7) Phase–Center Program
(8) Data Conversion (II)
(9) Antenna Feed Efficiency
(10) Stair Program
(11) Utku/Schmele Paraboloid RMS Best-Fit
(12) Best-Fit Paraboloid
(13) Radiation Pattern
(14) Antenna Noise Temperature

For design and optimization of an antenna, there are many possible applications of these programs. The Cassegrainian Synthesis Program is useful in determining ultimate limitations of feed system performance, and in providing insight into how performance may be improved. The Multimode Feed Pattern Synthesis Program may be used to generate a large class of potentially realizable primary feed patterns. A key program in design and optimization of Cassegrainian systems is the Scattering Program, since feed patterns and/or subreflectors may be evaluated without resorting to unrealistically large experimental programs. (Usually, it will be desirable to verify only the computations for the final design.)

The design applications of the Structural Programs are somewhat outside the scope of feed system design and analysis; however, in some respects, they are related (e.g., the structural variations with various f/D ratios and probable limitations on frequency).

It should be noted that the procedure for design and optimization of feed systems using this system of computer programs is largely empirical. A master program that automatically optimizes everything is an intriguing idea, but is difficult to realize. At present, the basic value of the majority of these programs is as a relatively inexpensive and rapid substitute for experimental work, and as a good independent check on final experimental results.

Notes:

1. The above listed computer programs were written in either Fortran II or Fortran IV. The machine requirements are an IBM 7090/94 computer system; however, they could be run on other systems, such as the IBM 1620, with little or no modification.

2. Inquiries concerning these programs may be directed to:

    COSMIC
    Computer Center
    University of Georgia 30601
    Athens, Georgia
    Reference: B67-10504

Patent status:

No patent action is contemplated by NASA.

Source: A. Ludwig
Jet Propulsion Laboratory
(NPO-10359)

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