NASA TECH BRIEF

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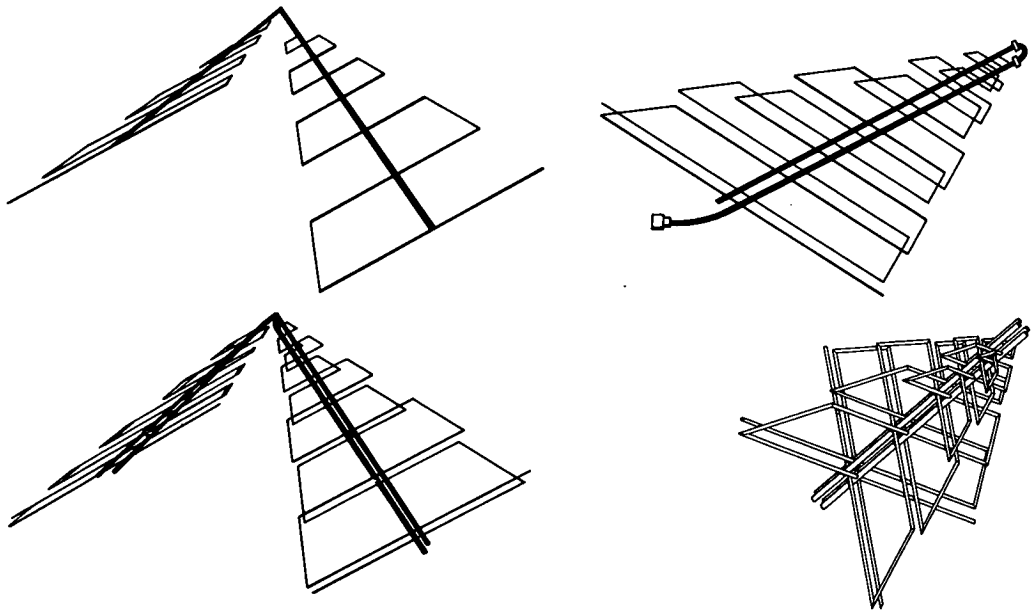
Antenna Configurations Provide Polarization Diversity



The problem:

The basic trapezoidal tooth log-periodic (TTLP) antenna operates in only one plane and one polarization. Arranging more elements in various configurations to provide dual-plane and multipolarization operation is impractical because of the size of the resulting structure and the interaction that would occur between the various elements.

The solution:

The angle between the two elements of a basic TTLP is reduced to zero to form a compact back-to-back antenna with frequency-independent characteristics. The back-to-back antenna can be arranged in various configurations to provide monopulse operation in one or two planes and in various polarizations.

How it's done:

A single coaxial cable, shielded by the support boom of one of the elements, is used to feed both elements of the back-to-back TTLP as seen at upper right. Arranging two of the back-to-back TTLP's and feeding each independently results in an array of back-to-back TTLP's as seen at lower left. Exciting the elements in and out of phase results in frequency independent monopulse operation in one plane and one polarization. Excitation is through hybrids and associated microwave equipment. Extending the structure still further by adding two more elements to form a pyramid would result in monopulse operation in two planes. Dual polarization operation is accomplished by employing two of the back-to-back TTLP's and

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meshing them orthogonally along the same axis as shown at lower right. The elements may be fed independently or together and by varying the phase or the current, circular and rotating linear polarizations can be obtained.

Notes:

1. Use of four of the elements, shown at lower right, arranged in a four-sided pyramid, permits monopulse operation in two orthogonal linear polarizations and right or left circular polarization.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland, 20771
   Reference: B66-10066

Patent status:

No patent action is contemplated by NASA.

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