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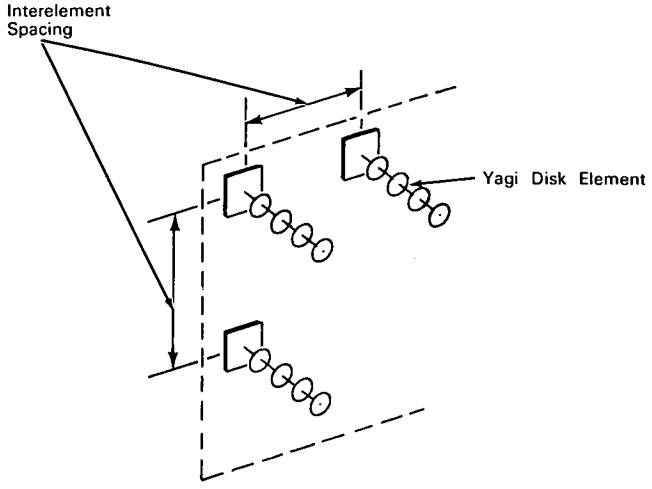
NASA TECH BRIEF

Modified Interelement Spacing Improves Yagi Antenna Array



The problem: The design of Yagi disk antenna arrays can be based on simple array theory and a knowledge of the field pattern of a single Yagi disk element. To design a symmetrical array on this basis requires interelement spacing of at least one wavelength to minimize interelement coupling. Interelement spacing of this magnitude, however, introduces spurious sidelobes (grating lobes) in the array pattern.

The solution: Adjust the Yagi disk interelement spacing so that the grating lobe of the array factor coincides with the first sidelobe of the element pattern.

How it's done: The radiation pattern of a Yagi disk antenna array is the product of the array factor and the element pattern if interelement coupling is negligible. Adjusting interelement spacing to make the grating lobe of the array factor coincident with the first sidelobe of the element pattern results in negligible interelement coupling and considerably reduces the amplitude of the grating lobe. Although the grating lobe could be reduced even further by adjusting interelement spacing to make the grating lobe coincident with the null between the main lobe and first sidelobe in the element pattern, this adjustment would make the amplitude of the grating lobe frequency-sensitive. Since there is negligible interelement coupling, and since no excessive energy is lost in grating lobes, the gain of an entire array can be predicted from a knowledge of the gain of a single element.

Note: Inquiries concerning this innovation may be directed to:

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Reference: B65-10183

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Fred B. Beck
(Langley-130)

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