

-Research Title:

Study of a Broadband Toroidal Array Antenna Composed of Bi-Conical Radiators for Radio Direction Finding

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Abstract:

This paper presents a proposed design for a bi-cone wire antenna that is simple in design and has the best electrical characteristics. A study of the effect of various geometric parameters of the antenna on its electrical properties was also presented. Numerical simulations were carried out of the radiation pattern, input impedance, and standing wave ratio (SWR) of the proposed antenna as a single element and also when used as a radiator within a toroidal array of these antennas. The numerical analysis was performed using the integrated equation's method, where the Pocklington equation was used as an integral equation. When solving it, impulse functions were used as basis and weight functions, and the MMANA simulation program was used. The results demonstrated that the proposed antenna operates over a very wide frequency range of 30-1450 MHz according to the criterion that the SWR ratio does not exceed 2 in a feed line with a specific wave impedance. It was also observed that the mutual influence between the bi-cone antennas within the ring array antenna leads to distortion of the radiation pattern of each radiator in the E and H planes and to a deterioration in matching. It was also observed that increasing the array radius reduces the degree of mutual influence.

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