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Inventors

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New Parallel Solenoid Feed Structure for True Magnetic Antennas

Traditionally, ferrite rod antennas have been fed with a solenoid of many turns. This configuration, especially at high frequencies, causes a phase delay as signal moves away from the feed center. Phase delay manifests in destructive interference, as signals which are out of phase with one another make contact. Destructive interference results in inefficiency and considerable signal loss. Multi-loop feeds are used to solve the problem of destructive interference. However, using multi-loop feeds requires a network of splitters and other elements to apply feed signals at multiple locations in the correct manner. These elements drive up production costs of parallel loop feed systems.

Researchers at Arizona State University have invented a new kind of electric feeding mechanism, called the parallel solenoid, for permeable or magnetic antennas. This feed mechanism is used for true magnetic antennas which are antennas that use permeable materials as their radiating elements and are ideal for electrically small conformal antenna applications. The feed structure optimizes the magnetic current distribution and the input impedance of such antennas and can be used for both improving the broad band matching of the antennas or as a tuning aid for narrow band applications. A single feed loop is used for the linear magnetic current dipole, which solves the considerable phase delay of conventional solenoid systems. Using a single feed loop eliminates issues with feed network matching circuits.

Potential Applications

- Permeable antennas
- True magnetic antennas
- Conformal antennas
- Magnetic antennas

Benefits and Advantages

- Performance –
 - Solves the considerable phase delay of conventional solenoid feeds.
 - Improved high frequency performance (bandwidth).
 - Maintains the flux, resulting in higher peak gain and higher realized gain.
- Low Cost –
 - Eliminates the need for expensive elements such as signal splitters from parallel feed systems.
 - Removes need for matching circuit networks for multiple-feed systems.

For more information about the inventor(s) and their research, please see

[Dr. Rodolfo Diaz's directory webpage](#)

