

Backfire-to-endfire Leaky-wave Antenna

Tech ID: 20312 / UC Case 2003-251-0

SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed, reduced to practice and characterized a broadband backfire-to-endfire microstrip antenna.

BACKGROUND

Conventional leaky-wave antennas use higher-order modes to frequency scan and as a consequence are limited to scanning half-space (broadside-to-endfire). In addition, special feeding structures must be added to suppress the dominant frequency mode. These additional elements increase the systems size and cost.

INNOVATION

There has been an emerging proliferation of interest in new man-made materials with unique properties that cannot be found in nature. These materials are referred to as meta-materials or left-handed media. First proposed by Veselago in the 60s, these materials possess a negative permittivity and permeability resulting in a negative refractive index. The negative refractive index results in electromagnetic radiation being focused by a flat lens versus being dispersed. This and other unique properties could enable unprecedented levels of RF/optical device and antenna miniaturization. A novel circuit design that utilizing the unique properties of left-handed transmission lines (essentially a high-pass filter with phase advance) along with conventional right-handed transmission lines (low-pass filter with phase lag). The resulting design is a new class of antennas that has many interesting applications e.g. antenna arrays. Compared to conventional higher-mode antennas this innovative antenna operates in the dominant mode and does not require any special feeding structure thus reducing size and cost.

STATE OF DEVELOPMENT

A novel leaky wave antenna with the capability of scanning from backfire-to-endfire has been demonstrated and characterized. This novel antenna has demonstrated a broad bandwidth of 61% (6 dB gain maintained across the full frequency range) compared to conventional leaky wave antennas.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Self-biased Receiver System](#)
- ▶ [Polarization Standing Wave Cavity Assisted By Anisotropic Structures](#)

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OTHER INFORMATION

KEYWORDS

communications

CATEGORIZED AS

- ▶ [Communications](#)
- ▶ [Wireless](#)

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