

## Backfire-to-endfire Leaky-wave Antenna

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### 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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### INVENTORS

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### OTHER INFORMATION

#### KEYWORDS

communications

#### CATEGORIZED AS

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

#### RELATED CASES

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