

Circularly-Polarized Antenna Measurement Method



Communications & Information

Digital Broadcasting, Telecommunication and Optoelectronics

Opportunity

The measurement of circularly-polarized (CP) antenna gains at millimeter-wave and terahertz range are challenging due to the short wavelength and the sensitivity to the mis-alignment error. Conventional methods for measuring CP gains rely on the phase information. However, accurate phase measurements are difficult because the alignment error becomes critical at very high frequencies. The invention discloses a rotation-free phaseless far-field gain measurement method of CP antennas. This method uses two types of CP antenna probes, a linearly-polarized standard-gain antenna to obtain the left-hand and right-hand CP gains of the antenna under test (AUT). No rotation to antenna feeds or phase information is required during the measurement. The measurement method is useful for gain measurements of CP antennas especially at millimeter-wave and terahertz range.

Technology

In this invention, two types of CP antenna probes need to be prepared for the measurement, which are left-hand circularly-polarized (LHCP) antenna probes and right-hand circularly-polarized (RHCP) antenna probes. These two types of CP antenna probes are required to be the same except for the polarization direction. A polarizer should also be added in front of a linearly-polarized (LP) antenna and changed the direction of polarization by mirroring the polarizer according to the E-plane of the LP antenna. In addition, a linearly-polarized standard gain antenna (SGA) needs to be prepared. Two measurement steps are conducted to get the cross-polarization level of the CP antenna probes, which are the amplitude of the forward voltage gain between two LHCP or two RHCP antenna probes and the amplitude of the forward voltage gain between a LHCP antenna probe and a RHCP antenna probe. Finally, during measuring steps, the phase center between the receiving and transmitting antenna should be constant and larger than the far-field range of each antenna.

Advantages

The invention solves the issues with the existing method which uses gain comparison method with standard circularly-polarized standard-gain antennas which has very small bandwidth and comprise many components to be assembled during measurement. Also, in the terahertz range, commercial circularly-polarized standard-gain antennas are usually not available. The invention is the only feasible method to fill in the blank.

IP Status

Patent granted

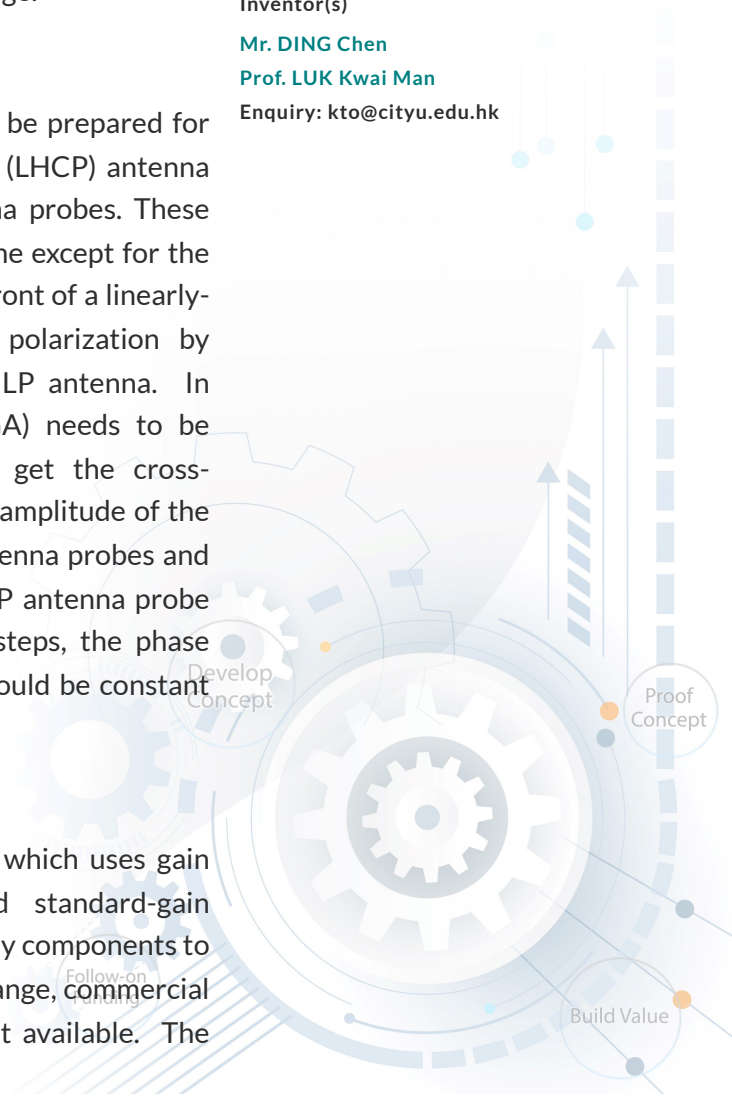
Technology Readiness
Level (TRL) ?

3

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Applications

- The invention provides a general antenna measuring method at a fundamental level. The invention could be integrated easily to the existing antenna measurement equipment and software.

