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Dual Polarized Feed Antenna Apparatus and Method of Use

Researchers at the University of South Florida have developed an approach to solve the problem associated with intercepting randomly polarized electromagnetic waves by designing a dual polarized antenna which can be used to increase the efficiency of solar energy harvesting or as an enhanced detector.

Past attempts to harvest high frequency radiation encountered several key problems, associated with impedance matching, rectification, limited bandwidth, captured power and polarization. Optical rectennas or rectifying antennas are the most favorable technique used to convert solar radiation to useable dc power, and the λ/2 dipole is the most commonly used antenna or receiving device for rectennas. This is because of its straight forward design procedure and ease of fabrication as a printed circuit antenna. However, the λ/2 dipole antenna has its shortcoming as an antenna for an optical detector. This is due to the fact that it only supports a single polarization and is therefore not useful for the collection of un-polarized electromagnetic energy such as solar radiation.

Our inventors have developed a method and device for the collection of electromagnetic energy using a dual polarized antenna for the collection of solar energy, overcoming the identified deficiencies of prior systems. The device intercepts randomly polarized electromagnetic waves which is excited through an aperture by using two well-isolated orthogonal feeds. Simulation and test results at 7 GHz yield convincing evidence that this technique can be used to allow the simultaneous interception of a randomly polarized electromagnetic wave by a single antenna. Furthermore, the concept can be extended to a linear array without difficulty.

The concept which is also viable at much lower frequencies will be most beneficial in the energy and communications industries.

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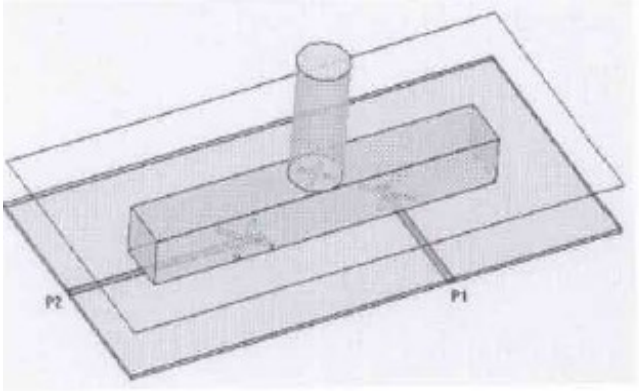
ADVANTAGES:

- **Increase efficiency of harvesting solar energy**
- **Intercepts randomly polarized EM waves**
- **Viable at much lower frequencies such as the microwave and RF regions**

Electromagnetic Energy Collector



Dual Polarized Solar Antenna

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