ISSN 1870-4069

Antenna Prototypes for Indoor and Outdoor Wi-Fi Communication

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Abstract. In previous works, we presented the development of a semi-spherical prototype irradiance meter. On the base of this device, we obtain the radiation patterns of two illumination sources, considering only nine sensors.

Keywords: Antenna, WiFi, indoor, outdoor.

1 Introduction

The meter is conformed by an arrangement of semi-spherical detectors, a signal conditioner circuit, and an acquisition card, for visualize the generated data using a program developed in LABVIEW (see figure 1) [1]. The sensor (amber Light Emitting Diodes) distribution is shown in figure 2. The meter was used to obtain irradiance profiles of illumination sources, and to realize their corresponding data fitting [2].

We are interested in the distribution of the irradiance, instead ofthe total irradiance over a complete region, which is the informationgiven by the actual spherical meters, such as the Ulbrich spheres. In the obtained discrete profiles we consider that the irradiance is proportional to the voltage intensity detected in each sensor of themeter. These voltage values permit us to obtain the correspondingprofile to each source and give as the capability to choice of themore adequate sources for specifics tasks.

2 Irradiance Bubble Profiles and Irradiance Patterns

In this case, we analyze the behavior of two illumination sources, shown in figure 3. The first one corresponds to a conventional light bulb, and the last one to a directional source.

We have found as very convenient illumination description to the bubble terms representation, with radius values proportional to the intensity voltage received in each sensor, for the case of researchanalysis. Still, for practical applications it is necessary to accountwith a most representative energy distribution, such as the radiationpatterns used for antennas in communications theory.

Fig. 1. Complete irradiance meter.

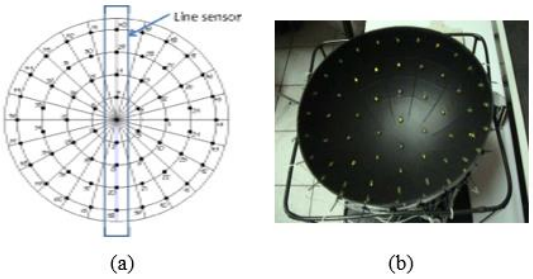

Fig. 2. (a) Sensor distribution and (b) frontal meter view.

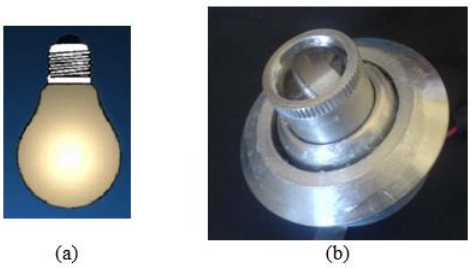

Fig. 3. (a) Light bulb, and (b) a directive source based onLED technology.

In figure 4 and 5, the corresponding irradiance profiles for both sources are presented.

From the information given by the line sensors shown in figure 2a, the irradiance patterns shown in figures 6 and 7, are generated.

Two sources are until certain level, considered as directive sources. When the necessity of illumination would be uniformity on certain area, the light bulb could be replaced by other more adequate, as save energy lamps,

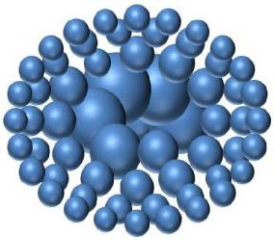

Fig. 4. Irradiance profile of a light bulb (white light,100W 127V).

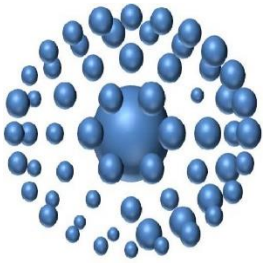

Fig. 5. Irradiance profile of the directive source.

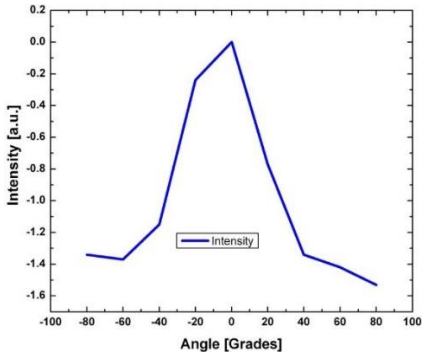

Fig. 6. Irradiance pattern of a light bulb (white light,100W 127V).

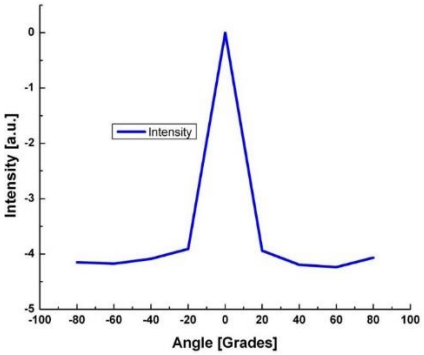

Fig. 7. Irradiance pattern of the directive source.

3 Conclusions

The deviation on symmetry shown in figures 6 and 7, considering as symmetry axe at cero grades, is due to the small differences in the LEDs responsivities. As can be appreciated, the number of samples to generate the irradiance patterns is much reduced, that in the case of irradiance bubble profiles, and for practical applications is more convenient because of its simplicity of interpretation.

On the base of this idea, another irradiance profile meter will be developed with a reduced number of sensors and the consequent small symmetry deviation.

References

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